

IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF DELAWARE

CMC MATERIALS, INC., )  
                          )  
Plaintiff,            )  
                          )  
v.                     ) C.A. No. 20-738-GBW  
                          )  
DUPONT DE NEMOURS, INC., et al., ) Redacted -  
                          )  
                          )  
Defendants.          )

**LETTER TO THE HONORABLE GREGORY B. WILLIAMS  
FROM JOHN W. SHAW**

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Dated: March 21, 2023

Dear Judge Williams,

Pursuant to Your Honor's Order dated March 7, 2023 (Dkt. No. 119), Plaintiff CMC Materials Inc. ("CMC") respectfully submits this letter to address Defendants' deficient Initial Invalidity Contentions (Exhibit A). More specifically, Defendants' obviousness theories are still both so numerous (there are hundreds of thousands of combinations) and so vague (Defendants do not even disclose which portions of the references they propose to combine, or how) that these combinations effectively fail to disclose any contention at all.

CMC therefore respectfully requests that the Court compel Defendants to (1) narrow their invalidity defense to six obviousness contentions<sup>1</sup> per asserted claim at least by April 14, 2023, followed by narrowing to three obviousness contentions per asserted claim for final contentions; and (2) at each stage, identify the portions of the references Defendants contend should be combined, and for which claim elements, as well as the specific alleged motivations to make each combination.

### I. Background

This is a single-patent case with 20 asserted claims (reduced from the 28 claims in the Amended Complaint). Defendants have known of the asserted claims, CMC's proposed claim constructions for those claims, and CMC's validity positions for those claims since 2020 during discovery in the parties' related International Trade Commission ("ITC") dispute, Inv. No. 337-TA-1204 (the "1204 Investigation"). In that matter, CMC asserted that Defendants infringed the same claims in connection with the same accused products at issue here. CMC proposed claim constructions for those claims and responded to Defendants' invalidity contentions for those claims in September 2020. In July 2021, the ITC's presiding Administrative Law Judge ("ALJ") found in favor of CMC on all issues, including claim construction, infringement, and validity. Ex. B (Initial Determination). The Commission affirmed, with slight modifications, the Initial Determination in December 2021, and adopted the ALJ's claim construction findings. Defendants did not appeal.

This case tracks the 1204 Investigation in many respects. CMC proposes to construe the asserted claims in exactly the same way as the ALJ did in the 1204 Investigation, and CMC asserts exactly the same infringement allegations based on the same evidence. *See* Ex. C (CMC's Proposed Claim Constructions). Defendants also assert the *exact* same prior art references they identified over two years ago and litigated throughout the 1204 Investigation. *Compare* Ex. A at 8–13 (Initial Invalidity Contentions), *with* Ex. D at 5–17 (Initial Invalidity Contentions, 1204 Investigation).

Defendants already have had an unusually long amount of time—more than two years and a full ITC Investigation—to consider, investigate, take discovery on, and develop invalidity theories based on the very references Defendants now again assert. Defendants' Initial Invalidity Contentions, however, do not reflect that experience. Instead, the contentions include hundreds of thousands of obviousness combinations, each utterly lacking in detail. Defendants' proposed

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<sup>1</sup> In this context, an "obviousness contention" shall be understood to be a contention that one or more prior art references renders a claim obvious. Thus, for example, contentions that include reference combination alternatives, such as "and/or" or "one or more" alternatives, shall constitute as many combinations as can be formed based on what is stated. For example, a combination that lists "A and/or B and/or C" shall count as four obviousness contentions: "A and B," "A and C," "B and C," and "A, B, and C." *See Greatbatch Ltd. v. AVX Corp.*, C.A. No. 13-723-LPS, D.I. 368 at 2 (D. Del. July 28, 2015).

obviousness ground #78 (out of 106 total) is illustrative. That ground asserts, for *each* asserted claim, the combination of “one or more” of *seven* different particle references (numbered in blue) either alone or in combination with “one or more” of *eight* patent references (numbered in red). That combination by itself covers more than *thirty thousand* potential combinations:<sup>2</sup>

78. All Asserted Claims are obvious over ***one or more Particle References*** selected from [1] Miller, et al., Langmuir, 21, 2005, 9733-9740, [2] van Blaaderen, et al., J. Colloid and Interface Science, 156, 1993, 1-18, [3] Liang, et al., Colloids and Surfaces A: Physicochem. Eng. Aspects, 426, 2013, 33-38, [4] Zhang, et al., Applied Surface Science 258, 2011, 1217-24, [5] Soto-Cantu, et al., Langmuir, 28, 2012, 5562-69, [6] Pálmai, et al., J. Colloid and Interface Science, 390, 2013, 34-40, and [7] Wu, et al., J. Colloid and Interface Science, 304, 2006, 119-124 ***either alone or in combination with one or more*** of [1] Japanese Pat. App. Pub. No. 2007-273910, [2] U.S. Pat. No. 7,753,974, [3] U.S. Pat. No. 7,994,057, [4] U.S. Pat. App. Pub. No. 2014/0024216, [5] U.S. Pat. App. Pub. No. 2013/0327977, [6] U.S. Pat. No. 8,529,787, [7] Japanese Pat. App. Pub. No 2011-216582, and [8] European Pat. App. Pub. No. 2,188,344;

Ex. A at 95 (Initial Invalidity Contentions) (emphasis and numbering added). Moreover, despite previously asserting these same references against the same claims, Defendants’ contentions do not identify any portion of any reference that they contend would have been obvious to combine with any other portion of any other reference, much less which claim limitation the unidentified combination allegedly discloses or why a person of ordinary skill in the art would have had motivation to make the combination. The other 105 grounds of Defendants’ obviousness contentions repeat these deficiencies. *Id.* at 78–101.

## II. Precedent Prohibits the Excessive Amount of Prior Art Combinations that Defendants Have Identified

Defendants contend that they do not have to limit their “number of invalidity arguments at this stage beyond the limits on the number of references set forth in the scheduling Order.” See Ex. E at 4 (P. Townsend Letter). But Defendants cannot present *hundreds of thousands* of obviousness arguments for each claim simply because the Scheduling Order does not set a specific limit. Defendants’ position is inconsistent with this Court’s practice.

In cases addressing similarly unbounded contentions, this Court has routinely limited the number of prior art arguments that can be made per claim. For example, in *PureWick*, this Court found defendant’s thousands of proposed obviousness combinations too numerous and required narrowing to approximately four obviousness combinations per asserted claim prior to the *Markman* hearing, with a second narrowing to three obviousness combinations per asserted claim before dispositive motions. See, e.g., *PureWick Corp. v. Sage Products LLC*, C.A. No. 19-1508-MN, D.I. 89 (D. Del. Oct. 28, 2020) (Noreika, J.) (oral order) (narrowing to 32 asserted claims and 130 obviousness combinations before *Markman* and further narrowing to 16 asserted claims and 48 obviousness combinations before dispositive motions); *PureWick*, C.A. No. 19-1508-MN, D.I. 82 at 2 (Oct. 5, 2020); see also *MQ Gaming, LLC v. Lego Systems, Inc.*, C.A. No. 19-905-MN,

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<sup>2</sup> The number of combinations can be calculated by multiplying the number of distinct options from the seven particle references (i.e.,  $C(7, 1) + C(7, 2) \dots + C(7, 7) = 127$ ) with the number of distinct options from the eight additional references (i.e.,  $C(8, 0) + C(8, 1) \dots + C(8, 8) = 256$ ), which amounts to 32,512 ( $127 \times 256$ ).

D.I. 60 at 1 (D. Del. June 10, 2020) (Noreika, J.) (oral order) (narrowing from 80 asserted claims and 480 invalidity arguments at initial contentions to 20 asserted claims and 60 invalidity arguments after summary judgment).

This Court also orders contentions to be narrowed when, as here, the parties are familiar with the issues due to prior litigation. *See Int'l Bus. Machines Corp. v. Expedia, Inc.*, C.A. No. 17-1875-LPS-CJB, D.I. 163 (D. Del. July 30, 2019) (Burke, J.) (oral order) (agreeing “that the reductions should be slightly more aggressive … in light of the data points now available to the parties … via those prior litigations.”). For example, in *Confluent Surgical* the Court ordered narrowing to four “prior art arguments” per asserted claim by the deadline for *initial* invalidity contentions in view of the parties’ familiarity with the issues to be litigated. *Confluent Surgical, Inc. et al v. HyperBranch Medical Technology, Inc.*, C.A. No. 17-688-LPS-CJB, D.I. 30 (D. Del. Oct. 30, 2017) (emphasis added). The Court emphasized that as “[t]his is the second related case between the parties … [and] these cases have already required a significant investment of Court and party resources … it is especially important in setting a case schedule in the second matter to be vigilant about maximizing efficiency … [to] better enable the parties to focus on key infringement and invalidity positions in the second case.” *Id.*

For the same reasons, CMC requests that the Court adopt a “more aggressive” narrowing schedule here to focus on key issues in this second case. *Int'l Bus. Machines*, C.A. No. 17-1875-LPS-CJB, D.I. 163; *Confluent Surgical*, C.A. No. 17-688-LPS-CJB, D.I. 30. CMC therefore proposes a narrowing to six obviousness contentions per asserted claim at least a month before Defendants’ scheduled claim construction proposals, followed by subsequent narrowing to three obviousness contentions per asserted claim for Defendants’ final contentions.

### **III. This Court Requires More Specificity in Obviousness Contentions than the Defendants Have Provided**

Defendants should also be compelled to provide basic information such as (a) which portions of each reference Defendants intend to combine for which limitation of the asserted claims and (b) what motivation to combine Defendants allege would have existed for each combination. Defendants’ current kitchen sink approach is prejudicial to CMC and impedes CMC’s ability to conduct effective fact discovery related to Defendants’ positions, including exploring the proposed combinations with party and non-party witnesses.

To the extent Defendants contend that it is premature to provide this information, such arguments are belied by Defendants’ two-year head start crafting obviousness combinations that could withstand the scrutiny of their clear and convincing burden of proof. Surely Defendants have developed more detailed obviousness theories than those presented in their Initial Invalidity Contentions. Now is the time to produce them. *See First Quality Tissue, LLC v. Irving Consumer Products Limited*, 2020 WL 6286862, at \*2 (D. Del. Oct. 27, 2020) (“[I]nvalidity contentions…are considered to be ‘initial disclosures’ under Rule 26(a), [and if a party] fails to provide information…the party is not allowed to use that information…to supply evidence on a motion, at a hearing, or at trial, unless the failure was substantially justified or is harmless.”); *see also* Fed. R. Civ. P. 26(a)(1)(E).

For all these reasons, CMC respectfully requests that the Court compel Defendants to narrow and supplement their invalidity contentions as outlined above.

Respectfully submitted,

*/s/ John W. Shaw (No. 3362)*

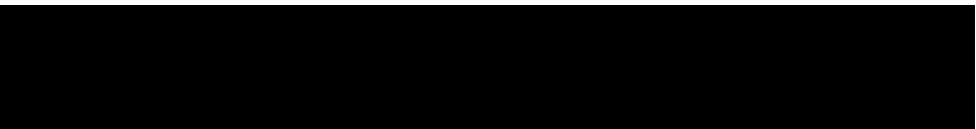
John W. Shaw

cc: Clerk of the Court (via CM/ECF & Hand Delivery)  
All counsel of record (via CM/ECF & E-mail)

# EXHIBIT A

**THIS EXHIBIT HAS BEEN  
REDACTED IN ITS ENTIRETY**

# Exhibit B



**UNITED STATES INTERNATIONAL TRADE COMMISSION  
WASHINGTON, D.C. 20436**

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**In the Matter of**

**CERTAIN CHEMICAL MECHANICAL  
PLANARIZATION SLURRIES AND  
COMPONENTS THEREOF**

**Inv. No. 337-TA-1204**

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**FINAL INITIAL DETERMINATION**

**Administrative Law Judge David P. Shaw**

Pursuant to the notice of investigation, 85 Fed. Reg. 40685 (July 7, 2020), this is the Initial Determination in *Certain Chemical Mechanical Planarization Slurries and Components Thereof*, United States International Trade Commission Investigation No. 337-TA-1204.

It is held that a violation of section 337 (19 U.S.C. § 1337) has occurred with respect to U.S. Patent No. 9,499,721.

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The following abbreviations may be used in this Initial Determination:

|      |   |                                     |
|------|---|-------------------------------------|
| ALJ  | - | Administrative Law Judge            |
| CDX  | - | Complainant's Demonstrative Exhibit |
| CPX  | - | Complainant's Physical Exhibit      |
| CX   | - | Complainant's Exhibit               |
| Dep. | - | Deposition                          |
| EDIS | - | Electronic Document Imaging System  |
| JPX  | - | Joint Physical Exhibit              |
| JX   | - | Joint Exhibit                       |
| P.H. | - | Prehearing                          |
| RDX  | - | Respondents' Demonstrative Exhibit  |
| RPX  | - | Respondents' Physical Exhibit       |
| RWS  | - | Rebuttal Witness Statement          |
| RX   | - | Respondents' Exhibit                |
| Tr.  | - | Transcript                          |
| WS   | - | Witness Statement                   |

[REDACTED]

## I. Background

### A. Institution of the Investigation; Procedural History

By publication of a notice in the *Federal Register* on July 7, 2020, pursuant to subsection (b) of section 337 of the Tariff Act of 1930, as amended, the Commission instituted this investigation to determine:

[W]hether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain products identified in paragraph (2) by reason of infringement of one or more of claims 1, 3–6, 10, 11, 13, 14, 18–20, 24, 26–29, 31, 35–37, and 39–44 of the '721 patent [U.S. Patent No. 9,499,721]; and whether an industry in the United States exists as required by subsection (a)(2) of section 337.

85 Fed. Reg. 40685 (July 7, 2020).

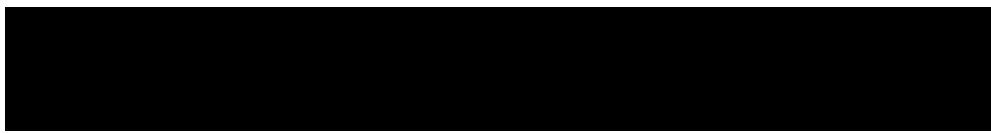
Pursuant to section 210.10(b)(1) of the Commission's Rules of Practice and Procedure, 19 C.F.R. § 210.10(b)(1):

[T]he plain language description of the accused products or category of accused products, which defines the scope of the investigation, is “chemical mechanical planarization (“CMP”) slurries and components thereof, including colloidal silica.”

*Id.*

The named complainant is Cabot Microelectronics Corporation of Aurora, Illinois. The named respondents are:

1. DuPont de Nemours, Inc. of Wilmington, Delaware;
2. Rohm and Haas Electronic Materials CMP Inc. of Newark, Delaware;
3. Rohm and Haas Electronic Materials CMP Asia Inc. (d/b/a Rohm and Haas Electronic Materials CMP Asia Inc., Taiwan Branch (U.S.A.)) of Taoyuan City, Taiwan;



4. Rohm and Haas Electronic Materials Asia-Pacific Co., Ltd. of Miaoli, Taiwan;
5. Rohm and Haas Electronic Materials K.K. of Tokyo, Japan; and
6. Rohm and Haas Electronic Materials LLC of Marlborough, Massachusetts.

The Office of Unfair Import Investigations is a party to this investigation. *Id.*

The target date for completion of this investigation was originally set at 15 months, *i.e.*, October 7, 2021, with an evidentiary hearing scheduled to commence on February 3, 2021. *See* Order No. 3 (July 16, 2020).

The Commission affirmed the following initial determinations:

- Order No. 7 (Initial Determination Granting Motion for Leave to Amend the Complaint and Notice of Investigation) (Oct. 1, 2020), *aff'd*, Commission Determination Not to Review an Initial Determination Granting Complainant's Motion to Amend the Complaint and the Notice of Investigation (Oct. 19, 2020).<sup>1</sup>
- Order No. 8 (Initial Determination Granting Motion for Leave to Amend the Complaint and Notice of Investigation) (Nov. 10, 2020), *aff'd*, Commission Determination Not to Review an Initial Determination Granting Complainant's Motion to Amend the Complaint and the Notice of Investigation (Nov. 24, 2020).<sup>2</sup>
- Order No. 12 (Initial Determination Granting Motion to Terminate the Investigation As to the Assertion of Infringement of Claim 5 of U.S. Patent No. 9,499,721) (Jan. 26, 2021), *aff'd*, Commission Determination Not to Review an Initial Determination Terminating the Investigation in Part Based on Withdrawal of Complainant's Allegation of Infringement as to Claim 5 of U.S. Patent No. 9,499,721 (Feb. 16, 2021).
- Order No. 13 (Initial Determination Granting Motion for Leave to Amend the Complaint and Notice of Investigation) (Jan. 26, 2021), *aff'd*, Commission

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<sup>1</sup> The initial determination (Order No. 7) granted the motion to amend the complaint and notice of investigation to include an allegation of infringement of claims 17 and 46 of the '721 patent.

<sup>2</sup> The initial determination (Order No. 8) granted the motion to amend the complaint and notice of investigation to change the name of the complainant from Cabot Microelectronics Corporation to CMC Materials, Inc.

[REDACTED]

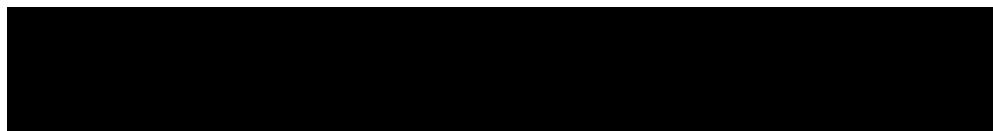
Determination Not to Review an Initial Determination Granting Complainant's Motion to Amend the Complaint and the Notice of Investigation (Feb. 12, 2021).<sup>3</sup>

A prehearing conference was held on February 3, 2021, with the evidentiary hearing in this investigation commencing immediately thereafter. The hearing concluded on February 5, 2021. *See* Order No. 5 (July 28, 2020); P.H. Tr. 1-17; Tr. 1-809. The parties were requested to file post-hearing briefs not to exceed 250 pages in length, and to file reply briefs not to exceed 65 pages in length. *See* Order No. 11 (Jan. 22, 2021) at 4. On February 19, 2021, the parties filed a joint outline of the issues to be decided in the Final Initial Determination. *See* Joint Outline of Issues to Be Decided in the Final Initial Determination (Pursuant to G.R. 11(a)) ("Joint Outline") (EDIS Doc. ID No. 734669). On March 5, 2021, the parties filed a joint outline for the reply briefs. *See* Joint Outline of Issues to Be Decided in the Final Initial Determination (Pursuant to Ground Rule 11(a)) ("Joint Reply Outline") (EDIS Doc. ID No. 736140).

On June 3, 2021, the undersigned issued an order setting the target date at approximately 15.6 months, *i.e.*, October 25, 2021, which made the deadline for this initial determination June 25, 2021. Order No. 16 (June 3, 2021). On June 21, 2021, the administrative law judge issued an order setting the target date at 16 months, *i.e.*, November 8, 2021, which makes the deadline for this initial determination July 8, 2021. Order No. 17 (June 21, 2021).

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<sup>3</sup> The initial determination (Order No. 13) granted the motion to amend the complaint and notice of investigation to change respondent "Rohm and Haas Electronic Materials CMP Inc." to "Rohm and Haas Electronic Materials CMP, LLC."



## B. The Parties

### 1. Complainant

Complainant CMC Materials, Inc. (“CMC” or “complainant”) is a leading global supplier of CMP slurries. *See JX-0019* (CMC 2019 Form 10-K) at 3. CMC is a publicly traded Delaware corporation and is the owner and assignee of the ’721 Patent. *See CX-0223* (Certified Assignment). CMC has CMP operations in the United States, including at its global R&D and manufacturing headquarters in Aurora, Illinois.

### 2. Respondents

Respondents<sup>4</sup> are DuPont de Nemours, Inc., a company organized under the laws of Delaware, and subsidiaries of DuPont de Nemours, Inc. located in the United States, Japan, and Taiwan, including Rohm and Haas Electronic Materials CMP Inc., Rohm and Haas Electronic Materials CMP Asia Inc., Rohm and Haas Electronic Materials Asia-Pacific Co., Ltd., Rohm and Haas Electronic Materials K.K., and Rohm and Haas Electronic Materials LLC.

\* \* \*

As noted, the Office of Unfair Import Investigations (“Staff”) is also a party to this investigation. 85 Fed. Reg. 40685 (July 7, 2020).

## C. Asserted Patent and Technological Background

U.S. Patent No. 9,499,721 (“the ‘721 patent”), entitled “Colloidal Silica Chemical-Mechanical Polishing Composition,” issued on November 22, 2016, to named

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<sup>4</sup> Hereinafter, respondents are collectively referred to as “DuPont” or “respondents.”

[REDACTED]

inventors Steven Grumbine, Jeffrey Dysard, Ernest Shen, and Mary Cavanaugh. JX-0001 ('721 Patent). The application leading to the '721 patent was filed on June 25, 2015, and claims priority to a provisional application filed on June 25, 2014. *See id.*; JX-0027 (Provisional Patent Application 62/017100). In the BRIEF SUMMARY OF THE INVENTION section, the '721 patent states, "A chemical-mechanical polishing composition is disclosed for polishing a semiconductor substrate." JX-0001 at 2:15-16.

The '721 patent has 46 claims, including 2 independent and 44 dependent claims. *See JX-0001 ('721 Patent).* For infringement, CMC asserts claims 1, 3–4, 6, 10–11, 13–14, 17–20, 24, 26–29, 31, 35–37, 39–44, and 46. *See Compl. Br. at xix, 45.* With respect to domestic industry, CMC asserts claims 1, 3–11, 13–21, 23, 26–29, 31–36, and 38–44. *See id. at xix, 92–93.*

#### D. The Accused Products

CMC argues:

Respondents' products that infringe the '721 Patent include Respondents' Optiplane 2300 product family, their Optiplane 2600 product family, and components thereof. The basic components of Respondents' Optiplane 2300 and 2600 families include:

[REDACTED]

*See, e.g., CX-0007C*

(Auger Dep.) at 85:16–86:6; JX-0207C [REDACTED] Optiplane 2300) at 2; JX-0278C (Optiplane 2600 Formulation); JX-0255C (OP2300 formulation); JX-0260C (OP2300 [REDACTED] formulation); JX-0197C (OP2300A Recipe); JX-0198C (OP2602 Recipe); JX-0391C (2602 Recipe); JX-0338C (2602 Manufacturing); JX-0253C (OP2602 formulation); JX-0278C [REDACTED] formulation).

Of all the components, the [REDACTED] particles imported by Respondents from [REDACTED] are the [REDACTED] component of the Accused Products. Hg. Tr. at 293:17–294:2; CX-0007C (Auger Dep.) at 88:20–25; CX-0010C (Guo Dep.) at 169:21–24; *see also* CX-0018C (Umberger

[REDACTED]

Dep.) at 55:12–13, 55:15–16, 155:16–19; JX-0207C (2017 Optiplane 2300 Presentation) at 2 [REDACTED]; JX-0176C (CMP Slurry Update) at 4 [REDACTED]

Compl. Br. at 10.

Respondents argue:

**Accused Products** - From the host of DuPont CMP slurries with a pH between about 1.5 and about 7, CMC only accuses DuPont's Optiplane™ 2300 and 2600 families of CMP slurries of infringement ("Accused Products"), based solely on [REDACTED] "particles from [REDACTED]. See RX-0006C (Dauskardt WS) at QA 142, 159, 165–173; EDIS DOC Id. 719941 (09/17/20 Respondents' Response to Complainant's Proposed Representative Prod.). Notably, the [REDACTED] particles, as imported by DuPont, are not themselves alleged to infringe.

To support its allegations of infringement, CMC seeks improperly to rewrite the history of DuPont's development of its acidic CMP slurries, characterizing DuPont's accused products as "copies" of CMC's alleged invention. Not so. DuPont was [REDACTED] before CMC's alleged invention, and [REDACTED] in a manner not patentable to CMC due to the well-established state of the art. *See infra* § XI. DuPont had [REDACTED]

[REDACTED] and before the alleged invention. RX-0443C (Nov. 7, 2012, Y. Guo email string); JX-0111C [REDACTED]; RX-1402C (Raghavan Reb. WS) at QA 22-47; RX-0441C [REDACTED] Price Table Email); JX-0289C ([REDACTED] Email to Chu); RX-0446C (Chu Sample Schedule Email). The [REDACTED] itself acknowledged that [REDACTED]

[REDACTED] were not inventions of CMC but were instead [REDACTED] RDX-0009C.016 (DuPont Demo.) (JX-0111C [REDACTED] at 4). [REDACTED] told DuPont that [REDACTED] JX-0215 [REDACTED] 2015 Presentation) at 11. DuPont is doing no more than using the prior art recognized in [REDACTED] and distinguished in the '721 patent. *Id.*; JX-0001 ('721 Patent) at 5:3-20 (distinguishing [REDACTED] in prior art).

DuPont's earlier work in developing positively charged acidic CMP slurries to polish silicon oxide material dates back to [REDACTED], well before the '721 patent. In [REDACTED] and others developed DuPont's

[REDACTED]

RX-1402C (Raghavan Reb. WS) at QA 23-26. By [REDACTED] DuPont had also used [REDACTED] particles in acidic ILD slurries, tested those slurries, and continued to develop acidic CMP slurries using those particles, including DuPont's [REDACTED]. *Id.* at QA 27-28, 38. [REDACTED] had for years been a known supplier of colloidal silica particles, designed for CMP slurries (RDX-0009C.003-05 (DuPont Demo.) (RX-0187C [REDACTED] Developing Slides) at 3, 10-11)) and introduced its [REDACTED] series" silica particles to DuPont in [REDACTED] (JX-0296C [REDACTED] Presentation) at 12). While DuPont [REDACTED], as noted above, [REDACTED] sent samples of [REDACTED] RX-1402C (Raghavan Reb. WS) at QA 29-38; JX-0298C (03/13/13 Email) [REDACTED]

[REDACTED]

Access to that material, however, was cutoff in [REDACTED] when CMC amended its agreement with [REDACTED] to sweep this prior art particle (*see infra* § XI.A) back under [REDACTED]

[REDACTED] RX-0110C ( [REDACTED] ) at 1-2. The [REDACTED] itself acknowledged that [REDACTED]

[REDACTED] were not inventions of CMC but were instead [REDACTED]

[REDACTED] RDX-0009C.016 (DuPont Demo.) (JX-0111C ( [REDACTED] ) at 4).

[REDACTED] RX-1402C (Raghavan Reb. WS) at QA 39-50.

[REDACTED] *Id.* at QA 40 (quoting CX-0010C (Guo Depo. Tr.) at 170:19-171:10); *see also* JX-0215C ([REDACTED] Presentation) at 11 [REDACTED]. DuPont's use of [REDACTED] particles, such as with the Accused Products, thus uses nothing invented by CMC.

CMC also mischaracterizes the [REDACTED] and DuPont supplier-customer relationship and misrepresents DuPont's involvement in the manufacture of [REDACTED] particles to suggest copying. *Id.* at QA 51-52. DuPont and [REDACTED] relationship, reflected in their general supply agreement and the numerous documents and testimony cited by CMC, amounts to a standard supplier-customer relationship. *Id.* at QA 53-66, 70, 87. In fact, the evidence cited by CMC to suggest DuPont's involvement in developing [REDACTED] post-dates [REDACTED] development and [REDACTED] offer of [REDACTED] particles to DuPont.

[REDACTED]

[REDACTED] particles supplied to DuPont are standard colloidal silica particles, not custom products made especially for the Accused Products. *See infra* § IV. DuPont's particle specifications simply control variability and ensure that [REDACTED] supplies a consistent product to DuPont and its customers. RX-1402C (Raghavan Reb. WS) at QA 67-72; *id.* at QA 71 (citing CX-0018C (Umberger Depo. Tr.) at 92:16-22). When Fuso and DuPont [REDACTED] particle specification in [REDACTED], they proposed ranges for pH, particle size, and other parameters irrelevant to the claimed properties of the '721 patent compositions. *Id.* Moreover, the [REDACTED] particle specification aligned closely with [REDACTED] proposal based on its [REDACTED] particle offerings to all of its customers. *Id.* at QA 73-75, 83-84 (discussing importation by third parties). Additionally, [REDACTED] advertises [REDACTED] particles as a " [REDACTED]" (*id.* at QA 85-86), and [REDACTED] has even marketed [REDACTED] to CMC. *Id.* at QA 86 (discussing RX-0341C (2017 [REDACTED] Presentation) at 19). Taken together, the evidence shows that DuPont has not been substantively involved in the design, research and development, or manufacture of [REDACTED] particles—particles imported by and advertised to others, including CMC. *Id.* at QA 75-87. [REDACTED] is a staple commodity.

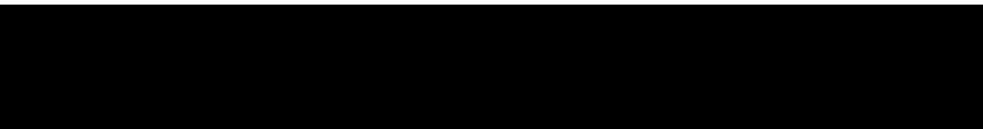
Reps. Br. at 15-18.

The Staff argues:

DuPont's accused products are the Optiplane 2300 product family, the Optiplane 2600 product family, and components thereof. The Optiplane 2300 family includes at least Optiplane 2300 [REDACTED] and Optiplane 2300A (a.k.a., OP2300 [REDACTED]). *See* JX-403C (Joint Stipulation Regarding Representative Accused Products). The Optiplane 2600 family includes at least Optiplane 2600, Optiplane 2601, Optiplane 2602, Optiplane 2300 [REDACTED], and products with identifiers [REDACTED]. *See id.*

DuPont's Optiplane 2300 and 2600 product families include the following basic components: [REDACTED]

[REDACTED]. *See, e.g.*, CX-0007C (Auger Dep.) at 85:16-86:6; CX-0128C (Optiplane 2300 Formulation); JX-0207C ([REDACTED] Optiplane 2300 - Advanced Acidic ILD Slurry, dated March 1, 2017) at 2; JX-0278C (Optiplane 2600 Formulation). CMC contends that DuPont, its customers, and certain third-party laboratories make, use, and sell the Accused Products and components thereof in a manner that



violates Section 337 and directly infringes the asserted claims of the '721 patent. CMC Br. at 66.

Staff Br. at 15.

As can be seen from the parties' arguments, there is no dispute that DuPont's accused products are the Optiplane 2300 product family, the Optiplane 2600 product family, and components thereof. The Optiplane 2300 family includes at least Optiplane 2300 (████████) and Optiplane 2300A (a.k.a., OP2300 █████). *See* JX-403C (Joint Stipulation Regarding Representative Accused Products) ("Joint Stipulation") (EDIS Doc. ID No. 720141). The Optiplane 2600 family includes at least Optiplane 2600, Optiplane 2601, Optiplane 2602, Optiplane 2300 (████████), and products with identifiers █████. *See id.*

#### E. The Domestic Industry Products

CMC argues, *inter alia*:

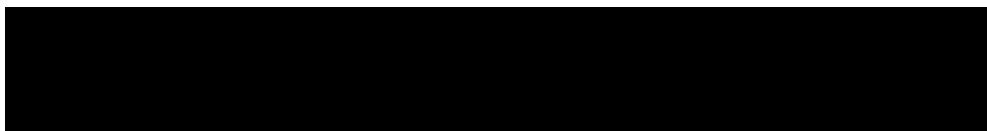
CMC's DI Products include the D922x family products, including D9228, D9222, D9225, D9228 7.5 X, █████ and developments and improvements thereof. CX-0001C (Woodland DWS) at Q/A 8. All of these products include █████ colloidal silica abrasive particles. CX-0002C (Grumbine DWS) at Q/A 30. Since being disclosed in 2014, and then first sold in 2015, the DI Products have been and continue to be adopted by numerous U.S. customers and have had undisputed commercial success. *See* CX-0001C (Woodland DWS) at Q/A 21, 38–39, 46; JX-0036C (2014 Industry Presentation); CX-0019C (Van der Velden Dep.) at 185:3–9; *id.* at 186:10–13 █████

████████); *id.* at 166:12–15.

Compl. Br. at 9.

Respondents argue, *inter alia*:

**DI Products** - CMC's alleged Domestic Industry Products are the D922X family of CMP slurries, including D9222, D9225, D9228, D9228 7.5x, █████ each using its █████ silica particles ("DI



Products”). See EDIS DOC Id. 716138 (07/31/20 Complainant’s Identification of DI Prod.).

Resps. Br. at 14-15.

The Staff argues, *inter alia*:

CMC’s Domestic Industry Products include the D922X family products, including D9228, D9222, D9225, D9228 7.5 X, [REDACTED] [REDACTED] and developments and improvements thereof. See CMC Br. at 11-12. They are part of CMC’s “dielectrics” product line, largely intended for polishing dielectric materials. *Id.* All of these products include [REDACTED] [REDACTED] colloidal silica particles; CMC continues to manufacture and sell in the United States its D922X family products. *Id.*

Staff Br. at 15.

As can be seen from the parties’ arguments, there is no dispute that CMC’s DI Products include the D922x family products, including D9228, D9222, D9225, D9228 7.5 X, [REDACTED] [REDACTED] and developments and improvements thereof. See CX-0001C (Woodland DWS) at Q/A 8. All of these products include [REDACTED] colloidal silica abrasive particles. See CX-0002C (Grumbine DWS) at Q/A 30.

## **II. Jurisdiction and Importation**

### **A. Jurisdiction**

Section 337(a)(1)(B) declares unlawful, *inter alia*, “[t]he importation into the United States, the sale for importation, or the sale within the United States after importation by the owner, importer, or consignee, of articles that . . . infringe a valid and enforceable United States patent.” 19 U.S.C. § 1337(a)(1)(B). Complainant has filed a complaint alleging a violation of this subsection, and the Commission therefore has subject matter jurisdiction. See *Amgen, Inc. v. United States Int’l Trade Comm’n*, 902

[REDACTED]

F.2d 1532, 1535-37 (Fed. Cir. 1990). The parties' arguments concerning importation are discussed below.

No respondent contested the Commission's personal jurisdiction. *See* Resps. Br. at 23. Indeed, all respondents have appeared and participated in the investigation. The Commission therefore has personal jurisdiction over those respondents. *See e.g., Certain Liquid Crystal Display Modules, Products Containing Same, and Methods for Using the Same*, Inv. No. 337-TA-634, Final Initial and Recommended Determinations at 3 (June 12, 2009) (unreviewed).

The Commission has *in rem* jurisdiction over the accused products. *See e.g., Sealed Air Corp. v. United States Int'l Trade Comm'n*, 645 F.2d 976, 985-86 (C.C.P.A. 1981). The parties' arguments concerning importation are discussed below.

## B. Importation

CMC argues:

Respondents do not dispute that it has imported both the accused Optiplane 2600 slurry and the BS-3 colloidal silica particles that are used to manufacture the accused CMP slurries. Hg. Tr. at 289:6–299:290; 293:15–294:5. Instead, Respondents claim that the importation of over [REDACTED] of Optiplane 2600 does not qualify as an “importation” under Section 337 because that product was “[REDACTED]” and further argue that the importation of over [REDACTED] of BS-3 colloidal silica particles does not qualify as an “importation” under Section 337 because those particles are not mixed into infringing CMP slurries until after they arrive in the United States. RPreHBr at 36, 39–40. Both arguments fail as a matter of law.

### 1. Respondents' Imported Accused CMP Slurries

Respondents do not dispute that they imported [REDACTED] kg of Optiplane 2600 slurry into the United States in late 2019. *See* CX-0055C (Invoices, Packing Lists, and Merchant Bill of Lading) at 5; JX-0005 (Shipment Results/Details – [REDACTED]); JX-0192C (OP2300 Manufactured and Returned); JX-0322C (CBP Form 7501 Entry

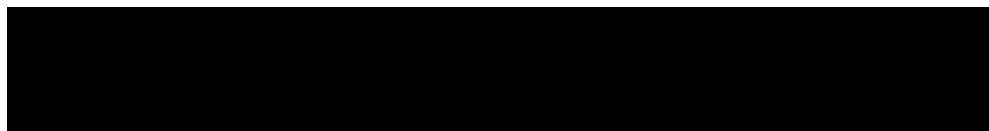
[REDACTED]

Summary); JX-0348C (Email from Ronald Hsin to Karen Chiang); RX-0483C (Invoices and Packing List); RX-0810C (Purchase Order); RX-0811C (Purchase Order); Hg. Tr. at 289:14–290:18; CX-0011C (Hutchinson Dep.) at 192:3–11, 197:10–19. This shipment is enough to satisfy the importation requirement. *See Certain Purple Protective Gloves*, Inv. No. 337-TA-500, Order No. 17 at 5 (Sept. 23, 2004) (“A complainant need only prove importation of a single accused product.”); *see also Certain Electronic Nicotine Delivery Systems & Components Thereof*, Inv. No. 337-TA-1139, Order No. 35 at 3 (Aug. 5, 2019).

Yet, Respondents incorrectly claim that their importation of [REDACTED] of Optiplane 2600 does not qualify as an “importation” under Section 337 because the slurry was “[REDACTED].” RPreHBr at 36, 39–40. But Section 337 does not distinguish [REDACTED] goods from other imported goods. RPreHBr at 36. Indeed, “Congress intended ‘[importation into the United States] to include importation by a respondent without regard to purpose.’” *Certain Activity Tracking Devices, Systems, & Components Thereof*, Inv. No. 337-TA-963, Order No. 27 at 3 n.4 (Feb. 1, 2016) (quoting *Certain Novelty Teleidoscopes*, Inv. No. 337-TA-295, Order No. 5 at 1 (May 19, 1989)); *see also Certain Sputtered Carbon Computer Disks & Products Containing the Same, Including Disk Drives*, Inv. No. 337-TA-350, USITC Pub. 2701 (“Carbon Coated Disks”), Comm’n Op. at 5 (Nov. 1993) (concluding that Section 337 “covers all ‘importations’ of infringing articles into the United States”). The Commission has found the importation requirement satisfied when the accused articles were manufactured in the United States, exported, and subsequently imported back into the United States. *See Carbon Coated Disks*, Comm’n Op. at 4–9; *Certain Digital Set-Top Boxes & Components Thereof*, 337-TA-712, ID at 14 (May 20, 2011) (“The Commission does not distinguish between importation and re-importation for purposes of establishing the jurisdictional requirement.”).

It also is irrelevant that the imported slurry was subsequently [REDACTED] by Respondents. “So long as there has been an importation,” “the fact that [a product] was not sold...or without commercial value is irrelevant.” *Certain Trolley Wheel Assemblies*, 337-TA-161, USITC Pub. 1605, Comm’n Op. at 8 (Nov. 1984). Even so, DuPont’s importation of Optiplane slurry into the United States *did* have commercial value. First, the documentation included with the shipment shows that it was valued at over [REDACTED]. *See* Hg. Tr. at 291:2–22; CX-0055C (Invoices, Packing Lists, and Merchant Bill of Lading) at 1, 2. Second, [REDACTED]

[REDACTED]. *See* JX-0287C (Risk Assessment of [REDACTED] OP2300); RX-1389C (Jacobs RWS) at Q/A 30–34.; Hg. Tr. at 289:14–23.



Third, DuPont continued to sell this same product to U.S. customers even after the subject importation. *See* Hg. Tr. at 293:2–14; RX-1389C (Jacobs RWS) at Q/A 36.

## **2. DuPont Imports Components of the Accused CMP Slurries**

Respondents do not dispute that they imported and continue to import BS-3 silica particles in the United States. Rather, Respondents argue that these importations should be exempted from Section 337 based on four flawed reasons: (1) Respondents’ manufacturing activities are “purely domestic,” (2) [REDACTED] is one of a number of components in the Accused Slurry Products,” (3) “the BS-3 particle is not even used as imported,” and (4) Respondents have not “been involved in the design or development of any [REDACTED] particles contained in the Accused Products.” RPreHBr at 39, 40, 42. None of these reasons are grounded in law or fact.

***First***, Respondents’ manufacturing activities are *not* “purely domestic,” as Respondents do not dispute that they import [REDACTED] colloidal silica particles into the United States<sup>5</sup> to be combined with other imported components in the manufacturing of the Accused Products. RPreHBr at 39; Hg. Tr. at 294:3–5; RX-1389C (Jacobs RWS) at CX-0018C (Umberger Dep.) at 55:12–21; Q/A 12; JX-0243C (Development Gate Presentation: Optiplane 2602) at 6; JX-0342C ([REDACTED] Importations); JX-0349C ([REDACTED] Importations); JX-0406C (Respondents’ Discovery Responses) at 25, 30, 32. Further, Respondents concede that they do not use the imported [REDACTED] particles to make any other products. *See* CX-0007C (Auger Dep.) at 218:21–219:3.

***Second***, the BS-3 particles are no less “imported” simply because they are combined with other components in the United States after importation. Preventing the combination of imported components into infringing products in the United States is squarely within the jurisdiction of the Commission. *See Certain Network Devices, Related Software & Components Thereof (II), Inv. 337-TA-945 (“Network Devices II”), Comm’n Op. at 123 (Jun. 1, 2017)* (“[Respondent] is barred from importing components of its devices and then assembling those devices

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<sup>5</sup> Respondents imported over [REDACTED] of BS-3 particles from [REDACTED] [REDACTED]. *See* JX-0349C (Fuso Importations); *see also* CX-0011C (Hutchinson Dep.) at 171:25–172:5, 175:21–176:8, 181:16–22, 182:10–19, 183:13–25; JX-0054 (Shipment Results/Details from Rohm/US Imports - Panjiva, April 28, 2020); JX-0055 (Shipment Results/Details – Dec. 6, 2018); JX-0056 (Shipment Results/Details – Feb. 27, 2019); JX-0057 (Shipment Results/Details–Mar. 6, 2019); JX-0193C (US Imports Shipments); JX-0343C (Invoice); JX-0358C (Bill of Lading); JX-0363C (CBP Form 7501 Entry Summary); JX-0382C (CBP Form 7501 Entry Summary).

into infringing products.”); *Certain Marine Sonar Imaging Devices, Including Downscan & Sidescan Devices, Products Containing the Same, & Components Thereof*, Inv. No. 337-TA-921 (Enforcement) (“Marine Sonar”), Comm’n Op. at 8 (Aug. 29, 2016) (clarifying that an LEO covered imported components that did not individually infringe but were used “for the purposes of assembling or ‘kitting’ the infringing devices”); *Certain Network Devices, Related Software & Components Thereof (I)*, Inv. No. 337-TA-944 (“Network Devices I”), Comm’n Op. at 23 (Apr. 19, 2017) (finding that respondent would “circumvent a Commission remedy by importing only the components of the accused products for reassembly into complete functional [products]”).

**Third**, Respondents also are incorrect that “the BS-3 particle is not even used as imported.” RPreHBr at 40. As explained by Kevin Jacobs, DuPont’s global product scale up manager, the [REDACTED] particles are pumped “directly” from the barrel in which it is imported into the tank where the infringing slurries are manufactured, without any pretreatment. Hg. Tr. at 294:22–295:23. And to the extent [REDACTED]

the BS-3  
[REDACTED] Respondents  
[REDACTED] particles  
[REDACTED] E.g., CX-0007C (Auger Dep.) at 89:2-4; JX-0231C (Update  
on New [REDACTED] Particle) at 2; JX-0212C (Optiplane 2300 Poster  
Presentation); JX-0176C (CMP Slurry Update) at 4.

*Fourth*, as explained in the context of indirect infringement below, Respondents *are* “involved in the design or development of [REDACTED] particles contained in the Accused Products.” RPreHBr at 42. And these particles are material and necessary components of the Accused Products, without which the intended purpose of the claimed invention could not be achieved. Thus, the Commission has jurisdiction over and can issue remedies as to Respondents’ colloidal silica abrasive particles. *See Certain Fluidized Supporting Apparatus & Components Thereof*, Inv. Nos. 337-TA-182/188 (“*Fluidized Supporting Apparatus*, ID, 1984 WL 273788 at \*55 (June 16, 1984) (finding jurisdiction where the “imported components are essential and even indispensable to the production of the [infringing article].”).

<sup>6</sup> Compl. Br. at 11-16.

<sup>6</sup> In this Initial Determination, unless noted otherwise, when quoting, emphases are from the original source, and footnotes from the original source are omitted.



Respondents argue:

DuPont does not import, sell for importation, or sell after importation any product alleged to infringe the '721 patent. As such, the evidence shows that CMC has not demonstrated that the ITC has jurisdiction over the instant investigation.

#### **A. Legal Standard**

To show a violation of Section 337, a complainant must satisfy the importation requirement set forth in 19 U.S.C. § 1337(a)(1)(B)(i) — “importation into the United States, the sale for importation, or the sale within the United States after importation by the owner, importer, or consignee, of articles that . . . infringe a valid and enforceable United States patent.” 19 U.S.C. § 1337(a)(1)(B)(i). A complainant bears the burden of showing the importation requirement of Section 337 is satisfied. *Certain Flash Memory Circuits and Prods. Containing Same*, Inv. No. 337-TA-382, Comm'n Op. at 5 (June 26, 1997). CMC cannot satisfy the importation requirement in this investigation, and thus cannot establish that the Commission has jurisdiction over the instant investigation.

#### **B. CMC Cannot Show the ITC Has Jurisdiction Over the Instant Investigation**

CMC’s importation allegations rest on the following shipments: (1) DuPont’s return of a shipment of seventy-two drums of [REDACTED] Optiplane™ 2300 slurry into the U.S. from Taiwan, CMC PreHB at 14-17, and (2) Respondents’ purported importation into the U.S. of colloidal-silica BS-3 particles, sold by Fuso Chemical Co., Ltd. (“Fuso”) from Japan. *Id.* at 17-19. Neither one of these two purported instances of importation satisfy 19 U.S.C. § 1337(a)(1)(B)(i).

As an initial matter, Cabot does not dispute that DuPont designed and developed the Accused Slurry Products at its [REDACTED] research and development facility in the U.S. RX-1398C (Jacobs Reb. WS) at QA 8. DuPont continues to further develop other non-accused slurry products in its [REDACTED] research and development facility. *Id.* at QA 8-9. DuPont has [REDACTED] who work at its [REDACTED] research and development facility occupying approximately [REDACTED] square feet with a budget of over [REDACTED] for labor, supplies and capital expenses. *Id.* at QA 8-10. DuPont’s research and development laboratory are equipped with a staffed [REDACTED] used in the development of the Accused Slurry Products at a cost in excess of [REDACTED]. *Id.* at QA 8.

[REDACTED]

Not only were the Accused Slurry Products developed in the U.S., they are also manufactured entirely at DuPont's manufacturing facility in [REDACTED]. *Id.* at QA 9-10. This over [REDACTED] square foot facility is equipped with over [REDACTED] dollars in fixed assets to manufacture the Accused Slurry Products. *Id.* at QA 10. DuPont also has over [REDACTED] employees involved in the manufacturing and quality control testing of the Accused Slurry Products. *Id.* DuPont has invested and continues to invest in labor and capital to manufacture the Accused Slurry Products in the U.S. *Id.* Thus, DuPont has a significant domestic industry in the U.S. with respect to the substantial investments it has made in the development and manufacture of the Accused Slurry Products. Because the Accused Slurry Products are entirely manufactured in the U.S., CMC cannot meet the importation requirement under 19 U.S.C. § 1337(a)(1)(B)(i).

In its Pre-Hearing Brief, the Staff contends that “domestic industries for the accused products [do] not immunize against importation.” Staff PreHB at 34. But this argument misses the point. Although a domestic industry may not “immunize” against importation if there is a nexus between the importation and the unfair act, no such nexus exists here, as discussed below.

#### C. Return of Optiplane™ 2300 for [REDACTED]

CMC contends that the sole return of one shipment of 72 drums of [REDACTED] Optiplane™ 2300 satisfies the importation requirement under 19 U.S.C. § 1337(a)(1)(B)(i) for *all* Accused Slurry Products. CMC PreHB at 15-16. CMC, however, has not shown that any other Accused Slurry Products, specifically Optiplane™ 2300A, Optiplane™ 2300 [REDACTED], Optiplane™ 2602, Optiplane™ 2601, [REDACTED], and Optiplane™ 2300 ([REDACTED] have been imported into the U.S. Thus, CMC cannot meet the importation requirement for these products. Nor can it satisfy the importation requirement required by the ITC statute based on the return of Optiplane™ 2300 for [REDACTED].

DuPont recalled [REDACTED] Optiplane™ 2300 slurry from one of its Taiwanese customers, [REDACTED] due to a [REDACTED]. RX-1398C (Jacobs Reb. WS) at QA 27-28. To address this issue, DuPont developed a product improvement that caused the previously manufactured Optiplane™ 2300 to be obsolete [REDACTED] *Id.* Thus, to ensure proper disposal of this obsolete product, DuPont returned the 72 drums of Optiplane™ 2300 slurry to the U.S. in a [REDACTED]. RX-0483C (Invoices, Packing Lists, and Waybill); RX-0810C (PO 4240119427), RX-0811C (PO 4240119706), RX-1129C (PO 4240145871), and RX-1130C (PO 4240139915). These seventy-two drums of Optiplane™ 2300, however, were produced



domestically in the U.S., exported from the U.S., and returned back to the U.S. for [REDACTED] RX-0737C (Mfg [REDACTED] Produced & Returned) (SAP document detailing the seventy-two drums that were issued, returned, and [REDACTED]); (Jacobs Hearing Tr.) at 304:4-12; CX-0012C (Jacobs Depo. Tr.) at 162:193 and 257:259; CX-0011C (Hutchinson Depo. Tr.) at 56:17-57:24; RX-1398C (Jacobs Reb. WS) at QA 30-31; JX-0192C (OP2300 Manufactured and Returned) (shows that the 72 drums of Optiplane™ 2300 [REDACTED] was manufactured between [REDACTED] in Delaware ([REDACTED])). The Customs records show that this shipment of Optiplane™ 2300 was returned and was thus considered a duty-free shipment. JX-0322C (12/8/19 U.S. Customs Entry Summary). DuPont therefore has not “imported” the Accused Slurry Products into the U.S. as required under 19 U.S.C. § 1337(a)(1)(B)(i).

Both the legislative history and Commission precedent compels this conclusion. The legislative history to Section 337 as well as Commission precedent shows that the ITC is meant to block unfair acts related to imported goods. *See, e.g. Suprema, Inc. v. ITC*, 796 F.3d 1338, 1345 (Fed. Cir. 2015) (en banc) (“Section 337 is an enforcement statute enacted by Congress to stop at the border the entry of goods, *i.e.*, articles, that are involved in unfair trade practices.”); *Certain Welded Stainless Steel Pipe and Tube*, Inv. No. 337-TA-29, Comm’n Determination and Action, at 11-12 (Feb. 22, 1978) (concurring opinion of three Commissioners noted that “Congress intended section 337 to attack only unfair trade practices which relate to imported practices. *It then becomes crucial to discern some nexus between unfair methods or acts and importation before this Commission has power to act.*”); *Certain Sputtered Carbon Coated Computer Disks and Products Containing Same, Including Disk Drives*, Inv. No. 337-TA-350, Comm’n Op. at 13 (Nov. 1, 1993) (additional views of two Commissioners noting that “The Commission has long held that there must be a nexus between unfair activities such as patent infringement, on the one hand, and importation, sale for importation, or sale within the United States after importation, on the other.”); H.R. Rep. No. 93-571, at 78 (1973); S. Rep. No. 93-1298 (1974).

Although the ITC has recognized, under certain circumstances, that the importation of a product originally manufactured in the U.S. and further processed overseas qualifies as an “importation” under Section 337, it has never based “importation” on the unique facts present here. *See Certain Sputtered Carbon Coated Computer Disks & Prods. Containing Same, Including Disk Drives*, Inv. No. 337-TA-350, Comm’n Op. at 9 (Nov. 1, 1993) (finding the importation requirement satisfied by the importation of a product originally manufactured in the U.S., shipped abroad for further processing, and imported to the U.S.). In contrast to the

[REDACTED]

facts of *Certain Sputtered Carbon Coated Computer Disks*, DuPont's accused products were wholly manufactured in the U.S. and returned to the U.S. solely for [REDACTED]. (Jacobs Hearing Tr.) at 302:19-303:2 (testifying that shipping Optiplane™ 2300 [REDACTED] back to the U.S. for [REDACTED]

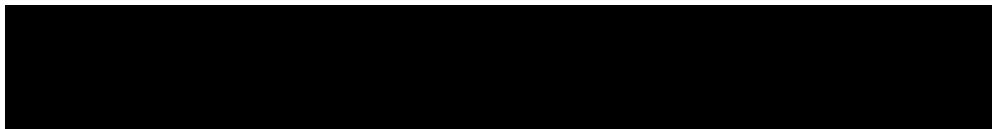
The accused Optiplane™ 2300 was not further processed overseas and then imported into the U.S. for sale. As such, this is not the type of "importation" contemplated by Congress when enacting Section 337. H.R. Rep. No. 93-571, at 78 (1973) ("Commission precedent, . . . establishes that the importation or domestic sale without license from the patent owner of *articles manufactured abroad* . . . constitutes an unfair method of competition or unfair act within the meaning of section 337"). Such an importation should not qualify as an "unfair act" under Section 337.

The Staff contends that Federal Circuit and Commission precedent addressing "the cessation or discontinuation of prior product designs provide the closest guidance" on the facts present here. Not so. The two cases on which the Staff relies, *Intel Corp. v. U.S. Int'l Trade Comm'n*, 946 F.2d 821 (Fed. Cir. 1991) and *Certain Condensers, Parts Thereof & Products Containing Same*, Inv. No. 337-TA-334, Comm'n Op. (Aug. 20, 1997), involve imported articles that were *manufactured* overseas. The very nature of the importation was different. Thus, these cases have no bearing on whether a domestically made good, returned to the U.S. for [REDACTED] constitutes an "unfair act" under Section 337.

The same is true for the cases relied upon by CMC. CMC relies on *Certain Activity Tracking Devices, Systems, & Components Thereof*, Inv. No. 337-TA-963, Order No. 27 (Feb. 1, 2016), *Certain Trolley Wheel Assemblies*, Inv. No. 337-TA-161, Comm'n Op. at 8 (Nov. 1, 1984), and *Carbon Coated Computer Disks* for the proposition that Congress intended Section 337 to cover any "importation by a respondent *without regard to purpose*." CMC PreHB at 17. But this expansive view does not comport with Commission precedent. See, e.g., *Certain Products Containing Interactive Program Guide and Parental Control Technology*, Inv. No. 337-TA-845, Comm'n Op. at 9-15 (Dec. 11, 2013). Nor does it comport with Federal Circuit precedent. See, e.g., *ClearCorrect Operating, LLC v. Int'l Trade Comm'n*, 810 F.3d 1283, 1286 (Fed. Cir. 2015) (finding that the importation of articles does not include electronic transmissions). Thus, the importation requirement should not be expanded to include returns of domestically manufactured articles for [REDACTED].

#### **D. Importation of BS-3 Particles Manufactured and Sold by Third-Party, Fuso**

CMC's second instance of importation, i.e., the importation of the



BS-3 particle sold by Fuso, is similarly flawed. Section 337 declares certain specific acts as unlawful, including importing “articles that ... infringe a valid and enforceable United States patent.” 19 U.S.C. § 1337(a)(1)(B). The ITC’s jurisdiction does not extend to purely domestic conduct. *Motiva, LLC v. Int’l Trade Comm’n*, 716 F.3d 596, 601 (Fed. Cir. 2013) (“[T]he Commission is fundamentally a trade forum, not an intellectual property forum”) (internal quotations and citation omitted). But that is precisely what CMC seeks to cover here.

The “unfair act” in this investigation, as alleged by CMC, involves the importation of a single, standard component used in a manufacturing process that occurs in the U.S. to produce the Accused Slurry Products. This is not the type of importation that Section 337 was intended or meant to include as unfair act under Section 337. 19 U.S.C. § 1337(a)(1)(B)(i).

### **1. No Nexus Exists Between the Importation of the Fuso BS-3 Particle and the Accused Slurry Products**

As background, DuPont purchases prior art, colloidal silica BS-3 particles from Fuso in Japan. DuPont then uses these submicron-sized silica particles to manufacture certain CMP polishing slurries in the U.S. at its [REDACTED] manufacturing plant. The Fuso BS-3 particle is sold by Fuso Chemical, along with other colloidal silica particles, for a variety of applications, including CMP slurries. JX-0296C (2015 High Purity Electronic Materials); JX-0125C (Fuso Chemical Colloidal Silica) at 3 (“Colloidal Silica” suggested for application for “CMP Slurry,” “Coating Materials,” “Paints,” and Fillers”); RX-0177C (2013 Pres.) at 14.

It is undisputed that the [REDACTED] particle is but one of a number of components in the Accused Slurry Products. [REDACTED] particles are imported into the U.S. and then combined with non-accused components in the U.S., and [REDACTED], to make the final, saleable slurry product. Each of these non-accused components and the [REDACTED] particles contribute to the overall effectiveness of the finished slurry product. Indeed, Dr. Dauskardt testified that in CMP slurries, particles interact with various chemicals to achieve the necessary performance. (Dauskardt Hearing Tr.) at 702:12-23; *see also id.* at 723:24-724:3 (testifying that CMP slurries are complex and adding one wrong component can cause the entire slurry performance to collapse). The functionality of the Accused Slurry Products depends not only on the contributions of each individual component but the interactions between all the various components in the composition. *Id.* Thus, CMC’s reliance on the [REDACTED] particle as an “importation” constituting an “unfair act” is even more tenuous given that it is but one component in the finished product.

[REDACTED]

Moreover, as shown below, the [REDACTED] particle is [REDACTED] colloidal silica abrasive particle in the Accused Slurry Products. RX-[REDACTED]

[REDACTED]

1402C (Raghavan Reb. WS) at QA 19. The Accused Slurry Products include [REDACTED] colloidal silica particles — (1) Optiplane™ 2600 comprises [REDACTED] particles, and (2) Optiplane™ 2300 includes [REDACTED] particles. *Id.*; see also JX-0207C ([REDACTED] OPTIPLANE 2300); JX-0241C (Acidic ILD Slurry). None of the Accused Products include a [REDACTED] [REDACTED]. RX-1402C (Raghavan Reb. WS) at QA 19.

In addition, the nexus between the imported [REDACTED] particle and the finished Accused Slurry Product is further undermined by the fact that the [REDACTED] particle is not even used as imported. As can be seen in the Optiplane™ 2300 “Manufacturing Process Flowchart” (reproduced below) there are a number of steps involved in the production process. JX-0207C ([REDACTED] Optiplane 2300 – Advanced Acidic ILD Slurry) at 10. Notably, DuPont employs an [REDACTED]

[REDACTED] RX-1402C (Raghavan Reb. WS) at QA 166. The [REDACTED] s all the colloidal silica particles in both the Optiplane 2300 and 2600 formulations as DuPont [REDACTED]

Thus, the [REDACTED] particles used in the Accused Slurry Products are [REDACTED]. *Id.*

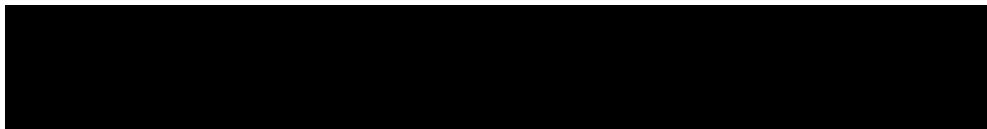
[REDACTED] RX-1398C (Jacobs Reb. WS) at QA 25-26.

The Staff notes that this [REDACTED] processing step may be a “valid consideration” but does not support DuPont’s position here, “because the . . . [REDACTED] that occurs domestically is a well-known *prior art* processing step rather than a novel aspect of the claimed invention allegedly embodied in the accused products.” Staff PreHB at 32 (emphasis original). The Staff does not acknowledge, however, that [REDACTED] has been marketing its colloidal silica particles for CMP applications for years before the filing of the patent application leading to the ’721 patent. RX-0443C (Guo [REDACTED] Pres.). In [REDACTED] for example, [REDACTED] was marketing both [REDACTED] particles to DuPont. *Id.*; (Dauskardt Hearing Tr.) at 691:16-692:7. Thus, the [REDACTED] particle was known to DuPont as early as [REDACTED].

Further, DuPont’s domestic manufacturing activities add significant value to the imported [REDACTED] particle. By way of analogy, even CMC has taken the position that “significant value is also added to the [Domestic Industry Products] by CMC’s manufacturing activities in the United States” which includes the incorporation of [REDACTED] [REDACTED] e, into the final slurry composition. JX-0399C (CMC 10/23/20 Supp. Resp. to First Interrogs.) at 165. Thus, CMC has not made an appropriate showing for importation of a component under Section 337 as there is lack of nexus between the imported component and the Accused Product.

## **2. The Fuso BS-3 Particle is not a Customized DuPont Component**

Throughout fact and expert discovery, as justification for grounding its jurisdictional allegations on the Fuso BS-3 particle, CMC has repeatedly contended that DuPont controls the characteristics of the BS-3 particles and that Fuso makes these particles to DuPont’s specifications. JX-0399C (CMC 10/23/20 Supp. Resp. to First Set of Interrogs.) at 252-253 and 258-59; RX-1402C (Raghavan Reb. WS) at QA 51-52. For the *first time*, in its Pre-Hearing Brief, CMC now contends that this argument is irrelevant and “Respondents improperly heighten the importation requirement under Section 337 by arguing that there can be no importation unless infringement is proven first.” CMC PreHB at 18. Because CMC failed to make this argument during contentions, it has waived the right to do so now. *Certain Road Construction Machines and Components Thereof*, Inv. No. 337-TA-1088 (Modification), Comm’n Op.

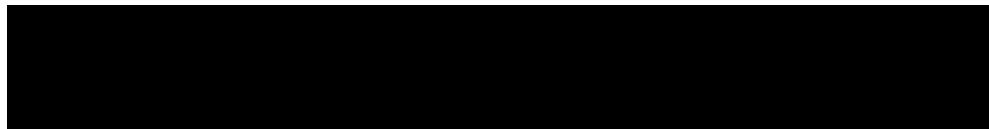


at \*7 (Sept. 14, 2020); *Certain RF Capable Integrated Circuits and Products Containing the Same*, Inv. No. 337-TA-982, Order No. 23 at \*2 (Mar. 9, 2017).

Even considering CMC’s untimely argument, CMC is wrong. As noted above, the alleged “unfair act” in this investigation rests upon the importation of a single component used in a product manufactured entirely in the U.S. This is not the type of importation that Section 337 was intended or meant to include as unfair act under Section 337. 19 U.S.C. § 1337(a)(1)(B)(i). Respondents’ arguments concerning importation address Complainant’s attempt to expand the scope of the ITC’s jurisdiction by relying on the importation of a single, standard component as a basis for “an unfair act.”

The facts of this particular investigation stand in stark contrast to other cases in which the ITC has found importation satisfied based on a component. Indeed, even the case upon which the Staff heavily relies, *Certain Fluidized Supporting Apparatus and Components Thereof*, Inv. Nos. 337-TA-182 and 337-TA-188, Initial Determination, 1984 WL 273788 (Jun. 16, 1984) misses the mark. In *Fluidized Supporting Apparatus*, the ALJ found that all respondents had imported and sold the fluidized beds at issue. *Id.* at \*59. The Staff contends that because one of the named respondents in that investigation, UHI, imported glass beads that were subject to further processing in the U.S., “post-importation processing of imported components did not defeat importation.” Staff PreHB at 35. But the Staff does not acknowledge that UHI was not just importing “beads,” rather it was found that “UHI places its orders with respondent Fuji, who manufactures portions of the fluidized bed in Japan, and ships them to UHI in the United States . . . Between March 15, 1983 and February 29, 1984, UHI imported from Japan [C] partly assembled therapeutic beds and spare parts manufactured and sold by Fuji. UHI imports from Japan the base, which contains the compressor unit, motor, heating device, and temperature controls; tank; glass beads; means for attaching the filter sheet; and wheels.” *Id.* at \*59 (internal citations omitted). Thus, *Fluidized Beds* does not address the unique situation here where a single imported component, further processed in the U.S., is relied upon to support a basis for jurisdiction at the ITC.

Simply put, CMC’s basis for importation rests on a standard raw material made by a third party that is publicly sold, is not customized, and existed in the prior art. See *infra* § VI.C. In *Certain Cardiac Pacemakers and Components Thereof*, Inv. No. 337-TA-162, Initial Determination at 1 (Mar. 21, 1984), the Commission terminated an investigation for lack of subject matter jurisdiction where the complainant based jurisdiction on two imported staple components that were used in “several non-infringing



applications.” The Commission determined that “[j]urisdiction ultimately turns on whether there is a nexus between the importation and the unfair act” and “the two imported components do not constitute the entire [accused product] and, therefore, cannot read on all elements of the claims recited in the suit patents.” *Id.* at 2; *see also Dynamic Random Access Memories, Component Thereof and Products Containing Same*, Inv. No. 337-TA-242, Comm’n Op. at 90-92 (Sept. 21, 1987). Just as in *Cardiac Pacemakers*, there is no nexus between the purported unfair act and the importation of BS-3 particles.

This investigation also diverges from situations where the imported component relied on to satisfy the importation requirement and establish infringement was either developed, assembled, or manufactured for or by the named respondent. For example, in *Certain X-Ray Breast Imaging Devices and Components Thereof*, Inv. No. 337-TA-1063, Initial Determination at 21 (July 26, 2018), Fujifilm made the components of the x-ray exposure unit in Japan and imported them into the U.S. for assembly into the Accused Products. There is no such evidence here, however.

DuPont and Fuso have only a customer/supplier relationship, in which DuPont purchases BS-3 particles from Fuso. RX-1402C (Raghavan Reb. WS) at QA 57. Years before the filing date of the asserted patent and pursuant to that relationship, DuPont (through its predecessor Dow Electronic Materials) and Fuso entered into a “Supplier General Quality Agreement,” effective in 2010. JX-0346C (Dow Supplier General Quality Agreement, effective 10/22/10). Notably, as the title suggests, this is a **general** agreement that DuPont enters into with all suppliers to ensure quality of the materials provided by its numerous suppliers. *Id.* at 1. Nothing in this document is specifically or uniquely tailored to Fuso. *Id.* Notably, any supplier can also choose not to agree with the conditions set forth in the general agreement if it so desires. *Id.* at 1, 8. Moreover, as was shown at the hearing, DuPont only uses Fuso BS-3 particles because Fuso stopped supplying [REDACTED] particles to DuPont due to an exclusivity agreement with CMC. RX-0039C (1st Am. & Rest. Sup. Agrmt.); RX-1400C (Herrington Reb. WS) at QA 97-98.

DuPont neither controls the characteristics of the Fuso BS-3 particles nor are these particles made to DuPont’s specifications, as discussed in more detail in Section VI.C.1. (Induced Infringement). Despite this, CMC contends that importation of this “critical component of the Accused Products induces infringement and, therefore violates Section 337.” CMC PreHB at 77-78. DuPont is not involved in the design, research and development, or manufacture of BS-3 particles. *See, e.g.*, RX-1402C (Raghavan Reb. WS) at QA 87. CMC provided no evidence showing that the manufacturing process for Fuso’s BS-3 particles resulted



from DuPont's negotiations, and not, for example, due to Fuso advertising BS-3 as a "████████" for Fuso. Nor has CMC cited any evidence that Fuso BS-3 particles themselves have the claimed "permanent positive charge" of at least 15 or 13 mV, or that DuPont directed Fuso to prepare particles with such a charge. Thus, CMC has failed to present evidence that DuPont's use of BS-3 particles is an affirmative step to induce or contribute to infringement.

In view of the above, CMC cannot meet its burden of establishing jurisdiction under 19 U.S.C. §1337(a)(1)(B).

Reps. Br. at 36-48.

The Staff argues:

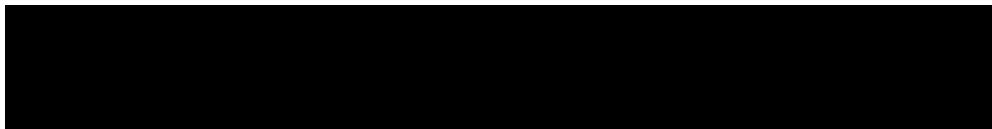
CMC contends that DuPont satisfies the importation requirement through its importation of certain CMP slurries and components thereof. Specifically, CMC alleged importation based on DuPont's activities directed to: (1) importing seventy-two drums of Optiplane 2600 slurry that were produced domestically, and later shipped abroad and re-imported from a customer in Taiwan; and (2) importation of ████████ colloidal silica particles used in the domestic manufacture of the Optiplane 2300 and Optiplane 2600 families of slurries. *See generally* CMC Br. at 15-19.

DuPont contends that neither accused act of importation constitutes "importation" within the statutory meaning of Section 337, and on that basis challenges the Commission's jurisdiction over this investigation. *See generally* DuPont Br. at 33-47.

The Staff is of the view that DuPont's importation of (1) seventy-two drums of formulated Optiplane slurry returned from Taiwan, and (2) Fuso BS-3 colloidal silica particles, are each sufficient under Section 337 to confer *in rem* jurisdiction, for the reasons explained below.

### **1. Re-Importation of Accused Product From Taiwan**

The Staff agrees with CMC that under applicable Commission precedent, DuPont's re-importation of accused product from Taiwan constitutes an act of importation under Section 337. *See Certain Sputtered Carbon Computer Disks & Products Containing the Same*, Inv. No. 337-TA-350, USITC Pub. 2701, Comm'n Op. at 4-9 (Nov. 1993) ("The statute, by its terms, does not limit coverage to articles of foreign manufacture. . . . We see no basis for respondents' position that the statutory term 'importation' excludes goods that have been 'reimported.'"); *Certain Digital Set-Top Boxes and Components Thereof*, Inv. No. 337-TA-712, Initial Determination at 14 (May 20, 2011) ("The



Commission does not distinguish between importation and re-importation for purposes of establishing the jurisdictional requirement.”).

DuPont emphasizes that the seventy-two drums of re-imported Optiplane were recalled from a Taiwanese customer purely for disposal purposes, emphasizing that the drums contained an old design that is currently “obsolete” [REDACTED] DuPont Br. at 36. To the extent DuPont suggests that its re-importation of an obsolete product was a one-time occurrence and will not be repeated, such that this accused act of importation is now moot, the Staff disagrees. *See Intel Corp. v. ITC*, 946 F.2d 821, 830 (Fed. Cir. 1991) (respondent’s “unilateral decision to stop manufacturing the ‘old’ design” did not moot investigation because “mere voluntary cessation of allegedly illegal conduct does not moot a case; if it did, the courts would be compelled to leave the defendant . . . free to return to his old ways.”); *Certain Condensers, Parts Thereof & Products Containing Same*, Inv. No. 337-TA-334, Comm’n Op. (Aug. 20, 1997) (“[I]mportation of even a single infringing article is sufficient to support an action under section 337, and discontinuance of unfair importation is not a defense under section 337.”) (citation omitted).

While DuPont argues that “CMC has not identified a single ITC investigation in which the Commission has found the importation requirement satisfied based on the return of a *sole* shipment of an accused domestically-made product to the U.S. [REDACTED]” (DuPont Br. at 38), it is equally true that DuPont has not identified any Commission precedent in which importation was not found under such circumstances. In the Staff’s view, the Federal Circuit and Commission precedent discussed above, addressing the cessation or discontinuation of prior product designs, provides the closest guidance, and weighs in favor of finding importation.

DuPont also invokes the nexus requirement as a final consideration weighing against finding importation. In the Staff’s view, the fact that the re-imported slurry product contains the [REDACTED] particles imported from [REDACTED] provides a sufficient nexus for purposes of importation, for the reasons explained below.

## **2. Importation of Accused Components From [REDACTED]**

DuPont concedes that it purchases [REDACTED] colloidal silica particles from [REDACTED], and that after those particles are imported into the United States, DuPont uses those particles to manufacture its accused products in Delaware. *See* DuPont Br. at 39. However, DuPont argues that its importation of [REDACTED] particles does not satisfy the importation of Section 337 based on several arguments, which the Staff addresses in turn below.



**1. Manufacturing Accused Products in the United States.**

DuPont contends that “CMC cannot meet the importation requirement” because the “Accused Slurry Products are entirely manufactured in the United States,” such that “DuPont has a significant domestic industry” with respect to its accused products. DuPont Br. at 35. In the Staff’s view, DuPont’s attempt to create Section 337 immunity based on the existence of U.S.-based manufacturing activities, without considering the nature of those activities, for its accused products risks unintended consequences, and risks establishing a potentially broad jurisdictional defense to a Section 337 claim. Accordingly, the Staff is of the view that simply alleging manufacturing activities for accused product(s) in the United States without evaluating the nature of those activities should not amount to a defense against importation that strips or extinguishes the Commission’s jurisdiction.

**2. Post-Importation Processing.** DuPont also argues that the

█████ particles do not satisfy the importation requirement because they are “not even used as imported,” but instead “are ██████████ that occurs domestically in Delaware. DuPont Br. at 40. In the Staff’s view, the ██████████ particles that originated *abroad*, in █████. Thus, DuPont imports a significant component of the accused products from █████. Moreover, the █████ particles are also accused of being a component of the accused products that satisfies a specific element of the asserted claims.

**3. No Customized Components.** DuPont contends it “is not and has not been involved in the design or development of any █████ particles contained in the Accused Products,” and thus there can be no importation based on such a “standard raw material made by a third party.” DuPont Br. at 44. In the Staff’s view, this argument conflates the importation requirement, a threshold jurisdictional inquiry, with the ultimate merits of CMC’s underlying contributory infringement claim under Section 271(c)—namely, whether the imported █████ particle is a “component” that is “especially made or especially adapted” for an infringing use.

The Staff is of the view that the distinct statutory provisions in Section 337 governing importation and infringement should remain separate and distinct, and should not be conflated with or subsumed by each other. DuPont’s position effectively would require CMC to prove its contributory infringement allegations against █████ simply to satisfy the importation requirement, transforming a threshold jurisdictional question into a full-blown substantive adjudication of the merits of CMC’s underlying patent infringement claim. In the Staff’s view, such an

[REDACTED]

approach would be contrary to Commission precedent emphasizing that the importation and infringement inquiries are separate and distinct analyses. *See Certain Dental & Orthodontic Scanners & Software*, Inv. No. 337-TA-1144, Initial Determination at 13 (Apr. 30, 2020) (“Importation is a separate inquiry from infringement, and the two inquiries, while related, should not be conflated.”).

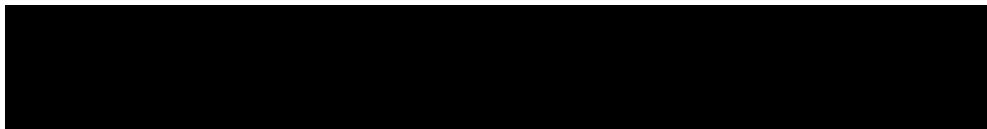
*Certain Fluidized Supporting Apparatus and Components Thereof*, Inv. Nos. 337-TA-182 and 337-TA-188, Initial Determination, 1984 WL 273788 (Jun. 16, 1984) is directly on point. There, the ALJ found that the respondents in each investigation had satisfied the importation requirement, despite evidence of the very same factual circumstances that DuPont now contends should preclude a finding of importation.

Specifically, the case involved consolidated Section 337 investigations brought by two U.S.-based companies—UHI Corporation (“UHI”) in Los Angeles, and Supporting Systems International (“SSI”) in South Carolina—against each other. Both entities had alleged importation based on each other’s importation of various structural components used to manufacture the accused hospital-type beds at issue in both investigations. *Id.* at \*4. In the Initial Determination, the ALJ found importation had been established as to all respondents in both investigations. *See id.* at \*59 (“[I]mportation and sale of the fluidized beds or components thereof has been established as to *all* respondents in Inv. Nos. 337-TA-182 and 337-TA-188.”).

Significantly, the ALJ’s importation finding arose in the context of factual circumstances materially identical to those DuPont now contends bar a finding of importation, as addressed in turn below.

**Accused Product Domestic Industry.** *First*, the ALJ found importation even though he also simultaneously found that UHI and SSI (who were both complainants and respondents, as a result of commencing Section 337 investigations against each other) had satisfied the domestic industry requirement with respect to their respective fluidized bed products. *See id.* at \*69 (“[T]here are domestic industries in Inv. No. 337-TA-182 and Inv. No. 337-TA-188 as defined by the domestic production, sale, rental and servicing of the fluidized beds by SSI and UHI.”). Thus, finding domestic industries for the accused products did not immunize against importation.

**Post-Importation Processing.** *Second*, the ALJ’s findings of fact also demonstrate that the post-importation processing of the accused hospital-bed components do not preclude a finding of importation. Specifically, UHI imported several components of its beds from Japan, including “glass beads.” UHI then performed post-importation processing



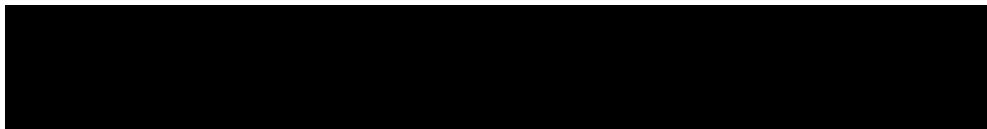
on those beads in Los Angeles, by “cooking” the beads in the bed at a high temperature. *See id.* at \*\*27-29, FF Nos. 251, 264, 278 (“UHI imports from Japan the base, which contains the compressor unit, motor, heating device, temperature controls; tank; **glass beads**; means for attaching the filter sheet; and wheels.”); (“The beads are **processed** at UHI’s facility in Los Angeles or at each branch. This is accomplished by ‘**cooking**’ the beads in the bed itself at a high temperature.”). Thus, the performance of post-importation processing of imported components did not defeat importation.

**Customized Components.** *Third*, the ALJ’s importation analysis indicates that the degree of customization of the accused components, or lack thereof, is immaterial to the importation analysis, as the ALJ found that SSI (whose imported components **were** modified to its “specifications”) and UHI (whose imported products were **not** described as modified in any way) had **both** satisfied the importation requirement. *See id.* at \*4, FF3 (noting that the “imported Fuji blower” is “a major component of the SSI bed” that “is **modified to SSI’s specification**”). Significantly, in finding jurisdiction and importation with respect to SSI, the ALJ focused on the **importance** of SSI’s imported components to the final accused product—and **not** the fact that they were modified to SSI’s specifications:

[T]here is a **sufficient link** between the alleged unfair acts and the assembled article if the importation of components of the article is an **important step** in the production and sale of the article . . . . Here, the imported components are **essential** and even **indispensable** to production of the beds made by SSI, and the importation is, therefore, an **important step** in the production and distribution of the article.

*Id.* at \*55. Thus, customized components designed specifically for or by a respondent are not a prerequisite for importation, contrary to DuPont’s assertion. Here, as in *Certain Fluidized Supporting Apparatus and Components Thereof*, the record evidence shows that the imported [REDACTED] [REDACTED] particles are important and essential to the operation of the accused products, and their importation from [REDACTED] is thus an indispensable, important step to the production and distribution of the accused products. *See, e.g.*, CX-0018C (Umberger Dep. Tr.) at 74:2-7.

**Domestic Assembly, Manufacturing, and R&D.** Finally, the ALJ also made several findings of fact indicating that the vast majority of SSI’s components were domestically sourced, and relevant R&D, manufacturing, and assembly also occurred domestically in the United States. *See id.* at \*\*26-27, FF234 (“SSI assembles its fluidized beds in the United States and obtains virtually all of the components for the product



from domestic suppliers.”); FF253 (“SSI’s production facilities are located at or adjacent to its headquarters in Charleston South Carolina”); FF256 (“SSI maintains a research and development facility in Charlotte, North Carolina”). Thus, importation may be found even if virtually all components and activities have domestic origins.

DuPont contends that because the [REDACTED] particle is a “standard raw material,” there can be no importation under *Certain Cardiac Pacemakers*, Inv. No. 337-TA-162, 1984 WL 273827, Initial Determination at \*2 (Mar. 21, 1984). But there, the “record contain[ed] evidence that both [imported components] are interchangeable, staple items that are used in several non-infringing applications.” *Id.* Here, by contrast, DuPont has not identified any such record evidence of substantial non-infringing uses by actual end-users. The mere fact that [REDACTED] particles are also “purchased by and promoted to other third parties” (DuPont Br. at 42) does not speak to whether those particles are used by third parties for substantial non-infringing uses. *See, e.g., Vita-Mix Corp. v. Basic Holding, Inc.*, 581 F.3d 1317, 1327 (Fed. Cir. 2009) (identifying examples of substantial non-infringing uses); *Ricoh Co. v. Quanta Computer Inc.*, 550 F.3d 1325, 1337-38 (Fed. Cir. 2008) (explaining that not all non-infringing uses for components are “substantial”).

Staff Br. at 27-33.

As shown, the parties briefed the importation issue in detail. The administrative law judge finds the arguments of CMC and the Staff persuasive. The undersigned disagrees with respondents’ arguments that unique facts are presented in this investigation for the purpose of determining whether importation requirement has been satisfied. The undersigned finds that importation requirement has been met, as summarized below.

In particular, under Commission precedent, DuPont’s re-importation of accused product from Taiwan constitutes an act of importation under section 337. *See Intel Corp. v. ITC*, 946 F.2d 821, 830 (Fed. Cir. 1991) (respondent’s “unilateral decision to stop manufacturing the ‘old’ design” did not moot investigation because “mere voluntary cessation of allegedly illegal conduct does not moot a case; if it did, the courts would be

[REDACTED]

compelled to leave the defendant . . . free to return to his old ways."); *Certain Condensers, Parts Thereof & Products Containing Same*, Inv. No. 337-TA-334, Comm'n Op. (Aug. 20, 1997) ("[I]mportation of even a single infringing article is sufficient to support an action under section 337, and discontinuance of unfair importation is not a defense under section 337.") (citation omitted).

Furthermore, under Commission precedent, DuPont's importation of accused components from [REDACTED], and subsequently using those particles to manufacture its accused products in Delaware is an act of importation under section 337. The facts in *Fluidized Supporting Apparatus* are similar. See *Certain Fluidized Supporting Apparatus and Components Thereof*, Inv. Nos. 337-TA-182 and 337-TA-188, Initial Determination, 1984 WL 273788 (June 16, 1984) at \*4, \*\*26-29, \*55, \*59, \*69; *Certain Fluidized Supporting Apparatus and Components Thereof*, Inv. Nos. 337-TA-182 and 337-TA-188, Comm'n Op., 1984 WL 63741 (Oct. 1984) at \*6 ("The ALJ found that respondent UHI imports partly assembled burn beds made by Fuji into the United States through Fuji and UHI Systems, that UHI leases or sells the burn beds in the United States and that respondent Katayama owns or controls, directly or indirectly, respondents UHI and UHI Systems. None of the respondents has petitioned for review of this finding and we concur with it.").

### **III. General Principles of Applicable Law**

#### **A. Claim Construction**

Claim construction begins with the plain language of the claim.<sup>7</sup> Claims should be given their ordinary and customary meaning as understood by a person of ordinary skill in the art, viewing the claim terms in the context of the entire patent.<sup>8</sup> *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005), *cert. denied*, 546 U.S. 1170 (2006).

In some instances, claim terms do not have particular meaning in a field of art, and claim construction involves little more than the application of the widely accepted meaning of commonly understood words. *Phillips*, 415 F.3d at 1314. “In such circumstances, general purpose dictionaries may be helpful.” *Id.*

In many cases, claim terms have a specialized meaning, and it is necessary to determine what a person of skill in the art would have understood the disputed claim language to mean. “Because the meaning of a claim term as understood by persons of skill in the art is often not immediately apparent, and because patentees frequently use terms idiosyncratically, the court looks to ‘those sources available to the public that show what a person of skill in the art would have understood disputed claim language to

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<sup>7</sup> Only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Vanderlande Indus. Nederland BV v. Int'l Trade Comm.*, 366 F.3d 1311, 1323 (Fed. Cir. 2004); *Vivid Tech., Inc. v. American Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

<sup>8</sup> Factors that may be considered when determining the level of ordinary skill in the art include: “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.” *Environmental Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696 (Fed. Cir. 1983), *cert. denied*, 464 U.S. 1043 (1984).

[REDACTED]

mean.”” *Phillips*, 415 F.3d at 1314 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1116 (Fed. Cir. 2004)). The public sources identified in *Phillips* include “the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art.” *Id.* (quoting *Innova*, 381 F.3d at 1116).

In cases in which the meaning of a claim term is uncertain, the specification usually is the best guide to the meaning of the term. *Phillips*, 415 F.3d at 1315. As a general rule, the particular examples or embodiments discussed in the specification are not to be read into the claims as limitations. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (*en banc*), *aff’d*, 517 U.S. 370 (1996). The specification is, however, always highly relevant to the claim construction analysis, and is usually dispositive. *Phillips*, 415 F.3d at 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). Moreover, “[t]he construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.” *Id.* at 1316.

Claims are not necessarily, and are not usually, limited in scope to the preferred embodiment. *RF Delaware, Inc. v. Pacific Keystone Techs., Inc.*, 326 F.3d 1255, 1263 (Fed. Cir. 2003); *Decisioning.com, Inc. v. Federated Dep’t Stores, Inc.*, 527 F.3d 1300, 1314 (Fed. Cir. 2008) (“[The] description of a preferred embodiment, in the absence of a clear intention to limit claim scope, is an insufficient basis on which to narrow the claims.”). Nevertheless, claim constructions that exclude the preferred embodiment are “rarely, if ever, correct and require highly persuasive evidentiary support.” *Vitronics*, 90

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F.3d at 1583. Such a conclusion can be mandated in rare instances by clear intrinsic evidence, such as unambiguous claim language or a clear disclaimer by the patentees during patent prosecution. *Elekta Instrument S.A. v. O.U.R. Sci. Int'l, Inc.*, 214 F.3d 1302, 1308 (Fed. Cir. 2000); *Rheox, Inc. v. Entact, Inc.*, 276 F.3d 1319 (Fed. Cir. 2002).

If the intrinsic evidence does not establish the meaning of a claim, then extrinsic evidence may be considered. Extrinsic evidence consists of all evidence external to the patent and the prosecution history, and includes inventor testimony, expert testimony, and learned treatises. *Phillips*, 415 F.3d at 1317. Inventor testimony can be useful to shed light on the relevant art. In evaluating expert testimony, a court should discount any expert testimony that is clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history, in other words, with the written record of the patent. *Id.* at 1318. Extrinsic evidence may be considered if a court deems it helpful in determining the true meaning of language used in the patent claims. *Id.*

## **B. Infringement**

### **1. Direct Infringement**

Under 35 U.S.C. §271(a), direct infringement consists of making, using, offering to sell, or selling a patented invention without consent of the patent owner. The complainant in a section 337 investigation bears the burden of proving infringement of the asserted patent claims by a “preponderance of the evidence.” *Certain Flooring Products*, Inv. No. 337-TA-443, Comm'n Notice of Final Determination of No Violation of Section 337, 2002 WL 448690, at \*59, (Mar. 22, 2002); *Enercon GmbH v. Int'l Trade Comm'n*, 151 F.3d 1376 (Fed. Cir. 1998).

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Literal infringement of a claim occurs when every limitation recited in the claim appears in the accused device, *i.e.*, when the properly construed claim reads on the accused device exactly.<sup>9</sup> *Amhil Enters., Ltd. v. Wawa, Inc.*, 81 F.3d 1554, 1562 (Fed. Cir. 1996); *Southwall Tech. v. Cardinal IG Co.*, 54 F.3d 1570, 1575 (Fed Cir. 1995).

If the accused product does not literally infringe the patent claim, infringement might be found under the doctrine of equivalents. “Under this doctrine, a product or process that does not literally infringe upon the express terms of a patent claim may nonetheless be found to infringe if there is ‘equivalence’ between the elements of the accused product or process and the claimed elements of the patented invention.” *Warner-Jenkinson Co., Inc. v. Hilton Davis Chemical Co.*, 520 U.S. 17, 21 (1997) (citing *Graver Tank & Mfg. Co. v. Linde Air Products Co.*, 339 U.S. 605, 609 (1950)). “The determination of equivalence should be applied as an objective inquiry on an element-by-element basis.”<sup>10</sup> *Id.* at 40.

“An element in the accused product is equivalent to a claim limitation if the differences between the two are insubstantial. The analysis focuses on whether the element in the accused device ‘performs substantially the same function in substantially the same way to obtain the same result’ as the claim limitation.” *AquaTex Indus. v.*

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<sup>9</sup> Each patent claim element or limitation is considered material and essential. *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534, 1538 (Fed. Cir. 1991). If an accused device lacks a limitation of an independent claim, the device cannot infringe a dependent claim. See *Wahpeton Canvas Co. v. Frontier, Inc.*, 870 F.2d 1546, 1552 n.9 (Fed. Cir. 1989).

<sup>10</sup> “Infringement, whether literal or under the doctrine of equivalents, is a question of fact.” *Absolute Software, Inc. v. Stealth Signal, Inc.*, 659 F.3d 1121, 1130 (Fed. Cir. 2011).

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*Techniche Solutions*, 419 F.3d 1374, 1382 (Fed. Cir. 2005) (quoting *Graver Tank*, 339

U.S. at 608); *accord Absolute Software*, 659 F.3d at 1139-40.<sup>11</sup>

Prosecution history estoppel can prevent a patentee from relying on the doctrine of equivalents when the patentee relinquished subject matter during the prosecution of the patent, either by amendment or argument. *AquaTex*, 419 F.3d at 1382. In particular, “[t]he doctrine of prosecution history estoppel limits the doctrine of equivalents when an applicant makes a narrowing amendment for purposes of patentability, or clearly and unmistakably surrenders subject matter by arguments made to an examiner.” *Id.* (quoting *Salazar v. Procter & Gamble Co.*, 414 F.3d 1342, 1344 (Fed. Cir. 2005)).

## **2. Indirect Infringement**

### **a. Induced Infringement**

Section 271(b) of the Patent Act provides: “Whoever actively induces infringement of a patent shall be liable as an infringer.” 35 U.S.C. § 271(b).

Under 35 U.S.C. § 271(b), whoever actively induces infringement of a patent shall be liable as an infringer. In contrast to direct infringement, liability for inducing infringement attaches only if the defendant knew of the patent and that the induced acts constituted patent infringement. *Commil USA, LLC v. Cisco Sys., Inc.*, 135 S. Ct. 1920, 1926 (2015); *see also Microsoft Corp. v. Datatern, Inc.*, 755 F.3d 899, 904 (Fed. Cir. 2014) (to prove induced infringement, patentee must show that accused inducer took an

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<sup>11</sup> “The known interchangeability of substitutes for an element of a patent is one of the express objective factors noted by *Graver Tank* as bearing upon whether the accused device is substantially the same as the patented invention. Independent experimentation by the alleged infringer would not always reflect upon the objective question whether a person skilled in the art would have known of the interchangeability between two elements, but in many cases it would likely be probative of such knowledge.” *Warner-Jenkinson*, 520 U.S. at 36.

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affirmative act to encourage infringement with knowledge that the induced acts constitute patent infringement). Induced infringement requires a finding that the infringer possessed a specific intent to encourage another's infringement. *i4i Ltd. Partnership v. Microsoft Corp.*, 598 F.3d 831, 851 (Fed. Cir. 2010), *aff'd*, 564 U.S. 91 (2011).

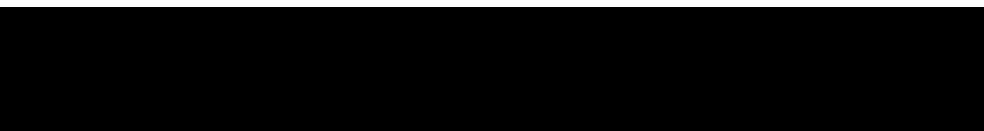
**b. Contributory Infringement**

Section 271(c) of the Patent Act provides: "Whoever offers to sell or sells within the United States or imports into the United States a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer." 35 U.S.C. § 271(c).

Section 271(c) "covers both contributory infringement of system claims and method claims."<sup>12</sup> *Arris*, 639 F.3d at 1376 (footnotes omitted). To hold a component supplier liable for contributory infringement, a patent holder must show, *inter alia*, that (a) the supplier's product was used to commit acts of direct infringement; (b) the product's use constituted a material part of the invention; (c) the supplier knew its product was especially made or especially adapted for use in an infringement" of the patent; and (d) the product is not a staple article or commodity of commerce suitable for substantial noninfringing use. *Id.*

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<sup>12</sup> "Claims which recite a 'system,' 'apparatus,' 'combination,' or the like are all analytically similar in the sense that their claim limitations include elements rather than method steps. All such claims can be contributorily infringed by a component supplier." *Arris*, 639 F.3d at 1376 n.8.



### C. Validity

One cannot be held liable for practicing an invalid patent claim. *See Pandrol USA, LP v. AirBoss Railway Prods., Inc.*, 320 F.3d 1354, 1365 (Fed. Cir. 2003). Nevertheless, each claim of a patent is presumed to be valid, even if it depends from a claim found to be invalid. 35 U.S.C. § 282; *DMI Inc. v. Deere & Co.*, 802 F.2d 421 (Fed. Cir. 1986).

A respondent that has raised patent invalidity as an affirmative defense must overcome the presumption by “clear and convincing” evidence of invalidity. *Checkpoint Systems, Inc. v. United States Int'l Trade Comm'n*, 54 F.3d 756, 761 (Fed. Cir. 1995).

#### 1. Anticipation

Anticipation under 35 U.S.C. § 102 is a question of fact. *z4 Techs., Inc. v. Microsoft Corp.*, 507 F.3d 1340, 1347 (Fed. Cir. 2007). Section 102 provides that, depending on the circumstances, a claimed invention may be anticipated by variety of prior art, including publications, earlier-sold products, and patents. *See* 35 U.S.C. § 102 (e.g., section 102(b) provides that one is not entitled to a patent if the claimed invention “was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States”).

The general law of anticipation may be summarized, as follows:

A reference is anticipatory under § 102(b) when it satisfies particular requirements. First, the reference must disclose each and every element of the claimed invention, whether it does so explicitly or inherently. *Eli Lilly & Co. v. Zenith Goldline Pharms., Inc.*, 471 F.3d 1369, 1375 (Fed.Cir.2006). While those elements must be “arranged or combined in the same way as in the claim,” *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1370

(Fed.Cir.2008), the reference need not satisfy an *ipsissimis verbis* test, *In re Bond*, 910 F.2d 831, 832-33 (Fed.Cir.1990). Second, the reference must “enable one of ordinary skill in the art to make the invention without undue experimentation.” *Impax Labs., Inc. v. Aventis Pharmas. Inc.*, 545 F.3d 1312, 1314 (Fed.Cir.2008); *see In re LeGrice*, 49 C.C.P.A. 1124, 301 F.2d 929, 940-44 (1962). As long as the reference discloses all of the claim limitations and enables the “subject matter that falls within the scope of the claims at issue,” the reference anticipates -- no “actual creation or reduction to practice” is required. *Schering Corp. v. Geneva Pharmas., Inc.*, 339 F.3d 1373, 1380-81 (Fed.Cir.2003); *see In re Donohue*, 766 F.2d 531, 533 (Fed.Cir.1985). This is so despite the fact that the description provided in the anticipating reference might not otherwise entitle its author to a patent. *See Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1562 (Fed.Cir.1991) (discussing the “distinction between a written description adequate to support a claim under § 112 and a written description sufficient to anticipate its subject matter under § 102(b)”).

*In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009).

## **2. Obviousness**

Under section 103 of the Patent Act, a patent claim is invalid “if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.”<sup>13</sup> 35 U.S.C. § 103. While the ultimate determination of whether an invention would have been obvious is a legal conclusion, it is based on “underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of

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<sup>13</sup> The standard for determining whether a patent or publication is prior art under section 103 is the same as under 35 U.S.C. § 102, which is a legal question. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1568 (Fed. Cir. 1987).

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nonobviousness.” *Eli Lilly and Co. v. Teva Pharmaceuticals USA, Inc.*, 619 F.3d 1329 (Fed. Cir. 2010).

The objective evidence, also known as “secondary considerations,” includes commercial success, long felt need, and failure of others. *Graham v. John Deere Co.*, 383 U.S. 1, 13-17 (1966); *Dystar Textilfarben GmbH v. C.H. Patrick Co.*, 464 F.3d 1356, 1361 (Fed. Cir. 2006). “[E]vidence arising out of the so-called ‘secondary considerations’ must always when present be considered en route to a determination of obviousness.” *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983). Secondary considerations, such as commercial success, will not always dislodge a determination of obviousness based on analysis of the prior art. See *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 426 (2007) (commercial success did not alter conclusion of obviousness).

“One of the ways in which a patent’s subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent’s claims.” *KSR*, 550 U.S. at 419-20. “[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.*

Specific teachings, suggestions, or motivations to combine prior art may provide helpful insights into the state of the art at the time of the alleged invention. *Id.* at 420. Nevertheless, “an obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents. The diversity of inventive pursuits and of modern technology counsels against limiting the analysis in this way.” *Id.*

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“Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* A “person of ordinary skill is also a person of ordinary creativity.” *Id.* at 421.

Nevertheless, “the burden falls on the patent challenger to show by clear and convincing evidence that a person of ordinary skill in the art would have had reason to attempt to make the composition or device, or carry out the claimed process, and would have had a reasonable expectation of success in doing so.” *PharmaStem Therapeutics, Inc. v. ViaCell, Inc.*, 491 F.3d 1342, 1360 (Fed. Cir. 2007); *see KSR*, 550 U.S. at 416 (a combination of elements must do more than yield a predictable result; combining elements that work together in an unexpected and fruitful manner would not have been obvious).<sup>14</sup>

### **3. Enablement**

The Patent Act requires that “[t]he full scope of the claimed invention . . . be enabled.” *Sitrick v. Dreamworks, LLC*, 516 F.3d 993, 999 (Fed. Cir. 2008); *see also Northpoint Tech. Ltd. v. MDS America Inc.*, 413 F.3d 1301, 1308-10 (Fed. Cir. 2005) (affirming a finding of invalidity for lack of enablement due to the patent’s failure to disclose an embodiment with an antenna that met the “directional reception range” limitation of each claim). Namely, “[a] patentee who chooses broad claim language must make sure the broad claims are fully enabled. ‘The scope of the claims must be less than or equal to the scope of enablement’ to ‘ensure[] that the public knowledge is enriched by

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<sup>14</sup> Further, “when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious.” *KSR*, 550 U.S. at 416 (citing *United States v. Adams*, 383 U.S. 39, 52 (1966)).

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the patent specification to a degree at least commensurate with the scope of the claims.””

*Sitrick*, 516 F.3d at 999 (quoting *National Recovery Techs., Inc. v. Magnetic Separation Sys., Inc.*, 166 F.3d 1190, 1195-96 (Fed. Cir. 1999)). The enablement requirement is satisfied when one skilled in the art, after reading the specification, could practice the claimed invention without undue experimentation. *AK Steel Corp. v. Sollac & Ugine*, 344 F.3d 1234, 1244 (Fed. Cir. 2003), citing *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988).

The question of undue experimentation is a matter of degree, and what is required is that the amount of experimentation not be “unduly extensive.” *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1253 (Fed. Cir. 2004) (quoting *PPG Indus., Inc. v. Guardian Indus., Corp.*, 75 F.3d 1558, 1564 (Fed. Cir. 1996)). For example, the fact that a clinician’s involvement may be necessary to determine effective amounts of the single compound effervescent agent and its corresponding soluble acid source does not itself constitute undue experimentation. *See Ortho-McNeil Pharm., Inc. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1365–66 (Fed. Cir. 2008) (“[E]ven if clinical trials informed the anticonvulsively effective amount, this record does not show that extensive or ‘undue’ tests would be required to practice the invention.”). In addition, extensive experimentation does not necessarily render the experiments unduly extensive where the experiments involve repetition of known or commonly used techniques. *See Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1360 (Fed. Cir. 1998) (finding that the difficulty in producing certain antibodies could not be attributed to the shortcomings in the disclosure of the patent at issue, but rather, the difficulty was attributed to the technique commonly used during experimentation that generally required repetition). Thus, the focus “is not merely quantitative, since a considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance . . . .” *PPG Indus., Inc.*, 75 F.3d at 1564 (citation and quotation omitted).

*Cephalon, Inc. v. Watson Pharms., Inc.*, 70 F.3d 1330, 1338-39 (Fed. Cir. 2013).

Enablement is determined from the viewpoint of persons of ordinary skill in the field of the invention at the time the patent application was filed. *Ajinomoto Co., Inc. v.*

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*Archer-Daniels-Midland Co.*, 228 F.3d 1338, 1345 (Fed. Cir. 2000). A claim in an issued patent can be rendered invalid due to lack of enablement if its scope is not fully enabled. *Id.*

#### **4. Written Description**

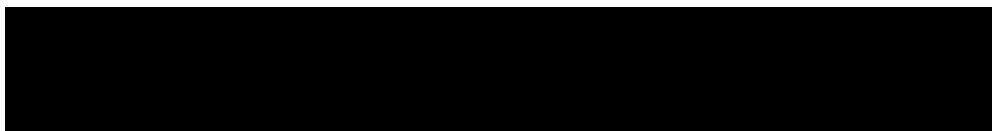
The issue of whether a patent is invalid for failure to meet the written description requirement of 35 U.S.C. § 112, ¶ 1 is a question of fact. *Bard Peripheral Vascular, Inc. v. W.L. Gore & Assocs., Inc.*, 670 F.3d 1171, 1188 (Fed. Cir. 2012). A patent's written description must clearly allow persons of ordinary skill in the art to recognize that the inventor invented what is claimed. The test for sufficiency of a written description is “whether the disclosure of the application relied upon reasonable conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Id.* (quoting *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (*en banc*)).

#### **5. Indefiniteness**

The definiteness requirement of 35 U.S.C. § 112 ensures that the patent claims particularly point out and distinctly claim the subject matter that the patentee regards to be the invention. See 35 U.S.C. § 112, ¶ 2; *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1366 (Fed. Cir. 2004). If a claim's legal scope is not clear enough so that a person of ordinary skill in the art could determine whether or not a particular product infringes, the claim is indefinite, and is, therefore, invalid. *Geneva Pharm., Inc. v. GlaxoSmithKline PLC*, 349 F.3d 1373, 1384 (Fed. Cir. 2003).<sup>15</sup>

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<sup>15</sup> Indefiniteness is a question of law. *IGT v. Bally Gaming Int'l, Inc.*, 659 F.3d 1109 (Fed. Cir. 2011).



Thus, it has been found that:

When a proposed construction requires that an artisan make a separate infringement determination for every set of circumstances in which the composition may be used, and when such determinations are likely to result in differing outcomes (sometimes infringing and sometimes not), that construction is likely to be indefinite.

*Halliburton Energy Servs. v. M-I LLC*, 514 F.3d 1244, 1255 (Fed. Cir. 2008).

The Supreme Court addressed the issue of indefiniteness, and stated that a finding of indefiniteness should not be found if the claims, “viewed in light of the specification and prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910 (2014).

The burden is on the accused infringer to come forward with clear and convincing evidence to prove invalidity. *See Young v. Lumenis, Inc.*, 492 F.3d 1336, 1344 (Fed. Cir. 2007) (“A determination that a patent claim is invalid for failing to meet the definiteness requirement in 35 U.S.C. § 112, ¶ 2 is a legal question reviewed de novo.”).

## **6. Inventorship**

“The burden of showing misjoinder or nonjoinder of inventors is a heavy one.” *BJ Servs. Co. v. Halliburton Energy Servs., Inc.*, 338 F.3d 1368, 1373–74 (Fed. Cir. 2003). 35 U.S.C. § 116 provides the standard for joint inventorship:

When an invention is made by two or more persons jointly, they shall apply for patent jointly and each make the required oath, except as otherwise provided in this title. Inventors may apply for a patent jointly even though (1) they did not physically work together or at the same time, (2) each did not make the same type or amount of contribution, or (3) each did not make a contribution to the subject matter of every claim of the patent.

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35 U.S.C. § 116.

“Because conception is the touchstone of inventorship, each joint inventor must generally contribute to the conception of the invention.” *Ethicon, Inc. v. U.S. Surgical Corp.*, 135 F.3d 1456, 1460 (Fed. Cir. 1998). Conception exists “when a definite and permanent idea of an operative invention, including every feature of the subject matter sought to be patented, is known.” *Sewall v. Walters*, 21 F.3d 411, 415 (Fed. Cir. 1994). In other words, conception is only complete when the “idea is so clearly defined in the inventor's mind that only ordinary skill would be necessary to reduce the invention to practice, without extensive research or experimentation.” *Burroughs Wellcome Co. v. Barr Labs., Inc.*, 40 F.3d 1223, 1228 (Fed. Cir. 1994).

Inventorship is a question of law based on underlying factual determinations. *Vapor Point LLC v. Moorhead*, 832 F.3d 1343, 1348 (Fed. Cir. 2016).

## **7. Inequitable Conduct**

“To prevail on a claim of inequitable conduct, the accused infringer must prove that the patentee acted with the specific intent to deceive the PTO.” *Therasense, Inc. v. Becton, Dickinson & Co.*, 649 F.3d 1276, 1290 (Fed. Cir. 2011) (*en banc*). “In other words, the accused infringer must prove by clear and convincing evidence that the applicant knew of the reference, knew that it was material, and made a deliberate decision to withhold it.” *Id.* “[T]o meet the clear and convincing evidence standard, the specific intent to deceive must be the single most reasonable inference able to be drawn from the evidence,” and thus, “when there are multiple reasonable inferences that may be drawn, intent to deceive cannot be found.” *Id.* at 1290-91 (citations omitted). “Intent and materiality are separate requirements,” and thus a court “may not infer intent solely from

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materiality. Instead, a court must weigh the evidence of intent to deceive independent of its analysis of materiality.” *Id.* at 1290. “The absence of a good faith explanation for withholding a material reference does not, by itself, prove intent to deceive.” *Id.* at 1291.

#### D. Domestic Industry

A violation of section 337(a)(1)(B), (C), (D), or (E) can be found “only if an industry in the United States, with respect to the articles protected by the patent, copyright, trademark, mask work, or design concerned, exists or is in the process of being established.” 19 U.S.C. § 1337(a)(2). Section 337(a) further provides:

(3) For purposes of paragraph (2), an industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the patent, copyright, trademark, mask work, or design concerned—

- (A) significant investment in plant and equipment;
- (B) significant employment of labor or capital; or
- (C) substantial investment in its exploitation, including engineering, research and development, or licensing.

19 U.S.C. § 1337(a)(3).

These statutory requirements consist of an economic prong (which requires certain activities)<sup>16</sup> and a technical prong (which requires that these activities relate to the

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<sup>16</sup> The Commission practice is usually to assess the facts relating to the economic prong at the time that the complaint was filed. See *Certain Coaxial Cable Connectors and Components Thereof and Products Containing Same*, Inv. No. 337-TA-560, Comm'n Op. at 39 n.17 (Apr. 14, 2010) (“We note that only activities that occurred before the filing of a complaint with the Commission are relevant to whether a domestic industry exists or is in the process of being established under sections 337(a)(2)-(3).”) (citing *Bally/Midway Mfg. Co. v. U.S. Int'l Trade Comm'n*, 714 F.2d 1117, 1121 (Fed. Cir. 1983)). In some cases, however, the Commission will consider later developments in the alleged industry, such as “when a significant and unusual development occurred after the complaint has been filed.” See *Certain Video Game Systems and Controllers*, Inv. No. 337-TA-743,

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intellectual property being protected). *Certain Stringed Musical Instruments and Components Thereof*, Inv. No. 337-TA-586, Comm'n Op. at 13 (May 16, 2008) (“*Stringed Musical Instruments*”). The burden is on the complainant to show by a preponderance of the evidence that the domestic industry requirement is satisfied. *Certain Multimedia Display and Navigation Devices and Systems, Components Thereof, and Products Containing Same*, Inv. No. 337-TA-694, Comm'n Op. at 5 (July 22, 2011) (“*Navigation Devices*”).

With respect to the economic prong, and whether or not section 337(a)(3)(A) or (B) is satisfied, the Commission has held that “whether a complainant has established that its investment and/or employment activities are significant with respect to the articles protected by the intellectual property right concerned is not evaluated according to any rigid mathematical formula.” *Certain Printing and Imaging Devices and Components Thereof*, Inv. No. 337-TA-690, Comm'n Op. at 27 (Feb. 17, 2011) (“*Printing and Imaging Devices*”) (citing *Certain Male Prophylactic Devices*, Inv. No. 337 TA-546, Comm'n Op. at 39 (Aug. 1, 2007)). Rather, the Commission examines “the facts in each investigation, the article of commerce, and the realities of the marketplace.” *Id.* “The determination takes into account the nature of the investment and/or employment activities, ‘the industry in question, and the complainant’s relative size.’” *Id.* (citing *Stringed Musical Instruments* at 26).

With respect to section 337(a)(3)(C), whether an investment in domestic industry is “substantial” is a fact-dependent inquiry for which the complainant bears the burden of Comm'n Op., at 5-6 (Jan. 20, 2012) (“[I]n appropriate situations based on the specific facts and circumstances of an investigation, the Commission may consider activities and investments beyond the filing of the complaint.”).

[REDACTED]

proof. *Stringed Musical Instruments* at 14. There is no minimum monetary expenditure that a complainant must demonstrate to qualify as a domestic industry under the “substantial investment” requirement of this section. *Id.* at 25. There is no need to define or quantify an industry in absolute mathematical terms. *Id.* at 26. Rather, “the requirement for showing the existence of a domestic industry will depend on the industry in question, and the complainant’s relative size.” *Id.* at 25-26.

Investments in plant and equipment, labor, and capital that are also related to research and development or licensing may be considered under subparagraph (C) as well as under subparagraphs (A) and (B). *Certain Optoelectronic Devices for Fiber Optic Communications, Components Thereof, and Products Containing the Same*, Inv. No. 337-TA-860, USITC Pub. No. 4852, Comm’n Op. at 15 (Nov. 2018); *Certain Solid State Storage Drives, Stacked Electronics Components, and Products Containing Same*, Inv. No. 337-TA-1097, Comm’n Op. at 14 (June 29, 2018) (“[T]he text of the statute, the legislative history, and Commission precedent do not support narrowing subsections (A) and (B) to exclude non-manufacturing activities, such as investments in engineering and research and development. Rather, the guiding principle is whether the asserted expenditures satisfy the plain language of the statute.”); *Certain Marine Sonar Imaging Devices, Including Downscan and Sidescan Devices, Products Containing the Same, and Components Thereof*, Inv. No. 337-TA-921, Comm’n Op. at 58-59, 64, 66 (Jan. 6, 2016) (reversing finding that expenses could not be counted under both subparagraphs (B) and (C); holding that the same R&D expenses “separately constitute[d]” a domestic industry under each subparagraph).

[REDACTED]

#### IV. U.S. Patent No. 9,499,721

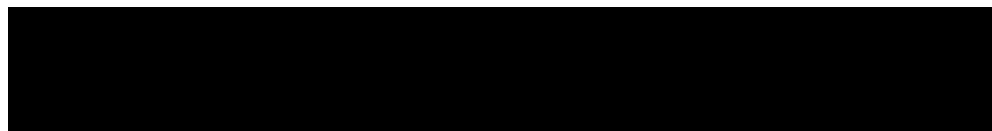
U.S. Patent No. 9,499,721 (“the ‘721 patent”), entitled “Colloidal Silica Chemical-Mechanical Polishing Composition,” issued on November 22, 2016, to named inventors Steven Grumbine, Jeffrey Dysard, Ernest Shen, and Mary Cavanaugh. JX-0001 (‘721 Patent). The application leading to the ‘721 patent was filed on June 25, 2015, and claims priority to a provisional application filed on June 25, 2014. *See id.*; JX-0027 (Provisional Patent Application 62/017100). In the BRIEF SUMMARY OF THE INVENTION section, the ‘721 patent states, “A chemical-mechanical polishing composition is disclosed for polishing a semiconductor substrate.” JX-0001 at 2:15-16.

The ‘721 patent has 46 claims, including 2 independent and 44 dependent claims. *See JX-0001* (‘721 Patent). For infringement, CMC asserts claims 1, 3–4, 6, 10–11, 13–14, 17–20, 24, 26–29, 31, 35–37, 39–44, and 46. *See Compl. Br.* at xix, 45. With respect to domestic industry, CMC asserts claims 1, 3–11, 13–21, 23, 26–29, 31–36, and 38–44. *See id.* at xix, 92–93.

As discussed below, the evidence shows that (1) the asserted claims are infringed by the accused products; (2) complainant has satisfied the technical prong of the domestic industry requirement; and (3) the asserted claims are not invalid.

Asserted independent claims 1 and 26 read as follows:

- 1. A chemical mechanical polishing composition comprising:**
  - a water based liquid carrier;
  - colloidal silica abrasive particles dispersed in the liquid carrier;
  - a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof, wherein the chemical species is***



*a nitrogen containing compound or a phosphorus containing compound;*  
a pH in a range from about 3.5 to about 6;  
*wherein the colloidal silica abrasive particles have a permanent positive charge of at least 15 mV; and*  
*wherein the chemical species is not an aminosilane or a phosphonium silane.*

**26. A chemical mechanical polishing composition comprising:**

a water based liquid carrier;  
colloidal silica abrasive particles dispersed in the liquid carrier;  
*a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof, wherein the chemical species is a nitrogen containing compound or a phosphorus containing compound;*  
a pH in a range from about 1.5 to about 7;  
*wherein the colloidal silica abrasive particles have a permanent positive charge of at least 13 mV; and*  
*wherein an aminosilane compound is bonded with the outer surface of the colloidal silica abrasive particles.*

JX-0001 ('721 Patent) at 39:63-40:9, 41:49-62 (emphasis added).

**A. Claim Construction**

**1. Applicable Law**

Claim construction begins with the plain language of the claim.<sup>17</sup> Claims should be given their ordinary and customary meaning as understood by a person of ordinary

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<sup>17</sup> Only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Vanderlande Indus. Nederland BV v. Int'l Trade Comm.*, 366 F.3d 1311, 1323 (Fed. Cir. 2004); *Vivid Tech., Inc. v. American Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

[REDACTED]

skill in the art, viewing the claim terms in the context of the entire patent.<sup>18</sup> *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005), *cert. denied*, 546 U.S. 1170 (2006).

In some instances, claim terms do not have particular meaning in a field of art, and claim construction involves little more than the application of the widely accepted meaning of commonly understood words. *Phillips*, 415 F.3d at 1314. “In such circumstances, general purpose dictionaries may be helpful.” *Id.*

In many cases, claim terms have a specialized meaning, and it is necessary to determine what a person of skill in the art would have understood the disputed claim language to mean. “Because the meaning of a claim term as understood by persons of skill in the art is often not immediately apparent, and because patentees frequently use terms idiosyncratically, the court looks to ‘those sources available to the public that show what a person of skill in the art would have understood disputed claim language to mean.’” *Phillips*, 415 F.3d at 1314 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1116 (Fed. Cir. 2004)). The public sources identified in *Phillips* include “the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art.” *Id.* (quoting *Innova*, 381 F.3d at 1116).

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<sup>18</sup> Factors that may be considered when determining the level of ordinary skill in the art include: “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.” *Environmental Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696 (Fed. Cir. 1983), *cert. denied*, 464 U.S. 1043 (1984).

[REDACTED]

In cases in which the meaning of a claim term is uncertain, the specification usually is the best guide to the meaning of the term. *Phillips*, 415 F.3d at 1315. As a general rule, the particular examples or embodiments discussed in the specification are not to be read into the claims as limitations. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (*en banc*), *aff'd*, 517 U.S. 370 (1996). The specification is, however, always highly relevant to the claim construction analysis, and is usually dispositive. *Phillips*, 415 F.3d at 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). Moreover, “[t]he construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction.” *Id.* at 1316.

Claims are not necessarily, and are not usually, limited in scope to the preferred embodiment. *RF Delaware, Inc. v. Pacific Keystone Techs., Inc.*, 326 F.3d 1255, 1263 (Fed. Cir. 2003); *Decisioning.com, Inc. v. Federated Dep't Stores, Inc.*, 527 F.3d 1300, 1314 (Fed. Cir. 2008) (“[The] description of a preferred embodiment, in the absence of a clear intention to limit claim scope, is an insufficient basis on which to narrow the claims.”). Nevertheless, claim constructions that exclude the preferred embodiment are “rarely, if ever, correct and require highly persuasive evidentiary support.” *Vitronics*, 90 F.3d at 1583. Such a conclusion can be mandated in rare instances by clear intrinsic evidence, such as unambiguous claim language or a clear disclaimer by the patentees during patent prosecution. *Elekta Instrument S.A. v. O.U.R. Sci. Int'l, Inc.*, 214 F.3d 1302, 1308 (Fed. Cir. 2000); *Rheox, Inc. v. Entact, Inc.*, 276 F.3d 1319 (Fed. Cir. 2002).

If the intrinsic evidence does not establish the meaning of a claim, then extrinsic evidence may be considered. Extrinsic evidence consists of all evidence external to the

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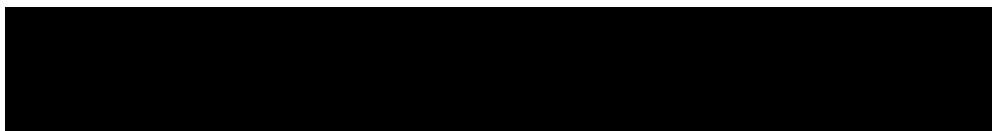
patent and the prosecution history, and includes inventor testimony, expert testimony, and learned treatises. *Phillips*, 415 F.3d at 1317. Inventor testimony can be useful to shed light on the relevant art. In evaluating expert testimony, a court should discount any expert testimony that is clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history, in other words, with the written record of the patent. *Id.* at 1318. Extrinsic evidence may be considered if a court deems it helpful in determining the true meaning of language used in the patent claims. *Id.*

## **2. A Person of Ordinary Skill in the Art**

CMC argues:

The appropriate level of ordinary skill in the art for the ‘721 Patent is an individual who, as of the priority date, had a bachelor’s degree in materials science, chemistry, chemical engineering, or a closely related field, with three or more years of experience in processing of electronic materials. SPreHBr at 38; CX-0006C (Dauskardt DWS) at Q/A 41. The minor differences in Respondents’ proposed level of skill do not impact the substantive arguments or analysis although, as noted herein below, certain of Respondents’ experts, including at least Dr. Klein and Dr. Miller, approach certain Section 112 issues without sufficiently considering the perspective and base knowledge of a person having experience in CMP slurries—the field of the invention of the ‘721 Patent—and those opinions therefore should be viewed with skepticism for at least that reason, and because these experts would not qualify as POSAs under this standard. See CX-0006C (Dauskardt DWS) at Q/A 42–43; Hg. Tr. (Klein) at 414:25–416:22 (testifying that she “never worked in CMP industry,” “never developed a CMP slurry,” “never developed a colloidal silica particle for use in a CMP slurry,” “never operated a CMP machine,” and did not speak with anyone “to get their views on the issues from a perspective of a CMP scientist”); Hg. Tr. (Miller) at 370:9–371:12 (testifying that he has “never researched or developed any CMP slurries,” “never tested a CMP slurry,” and never “had any prior experience at all with CMP”); RX-1075C (Miller DWS) at Q/A 33–36; RX-1073C (Klein DWS) at Q/A 33.

Compl. Br. at 16-17.



Respondents argue:

A person of ordinary skill in the art (“POSA”) for the ‘721 patent should be defined as:

A person with an advanced degree involving materials science, chemistry, applied physics, mechanical engineering, or the like, and at least two years of experience designing, developing, or researching in the field of CMP slurries and/or colloid science, or alternatively, that person would have had a bachelor’s degree involving materials science, chemistry, applied physics, mechanical engineering, or the like, and at least three years of experience designing, developing, or researching in the field of CMP slurries and/or colloid science.

RX-1076C (Raghavan WS) at QA 70-72. This definition is consistent with, *inter alia*, the background of named inventors (E.g., CX-0004C (Dysard WS), ¶6 (Ph.D. in chemistry), CX-0002C (Grumbine WS), ¶6 (Ph.D. in chemistry)) and the prior art. *See Daiichi Sankyo Co., Ltd. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007).

Reps. Br. at 18.

The Staff argues, “Although the Staff is of the view that there are no material differences between the proposed definitions that would significantly affect any analysis in this investigation, for purposes of its analysis, the Staff has adopted CMC’s proposed definition.” Staff Br. at 35.

As shown, CMC proposes a broader experience in “processing of electronic materials” whereas respondents propose experience specific to the “field of CMP slurries and/or colloid science.” CMC’s proposed broader level of ordinary skill is more persuasive, and respondents’ proposed experience requirement is too restrictive. Indeed, as seen by CMC’s arguments above, certain respondents’ experts may not qualify as persons of ordinary skill under respondents’ proposed two or three years of experience “designing, developing, or researching in the field of CMP slurries and/or colloid

science.” As noted, CMC’s proposed level requires at least a bachelor’s degree in materials science, chemistry, chemical engineering, or a closely related field, with three or more years of experience in processing of electronic materials. Thus, the administrative law judge finds that a person of ordinary skill in the art (“POSA”) with respect to the asserted ‘721 patent is a person who has at least a bachelor’s degree in materials science, chemistry, chemical engineering, or a closely related field, with three or more years of experience in processing of electronic materials.

### **3. Agreed Claim Terms**

Below is a chart showing the parties’ proposed claim constructions.

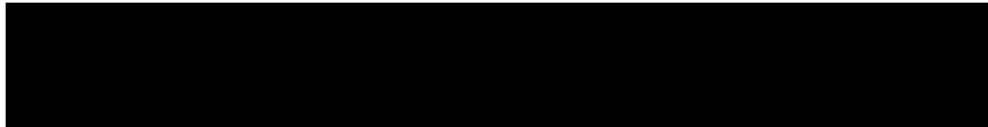
| <b>Claim Term</b>    | <b>Claim(s)</b> | <b>Agreed Upon Construction</b>                                                                                                                                        |
|----------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Acid                 | 24              | “Acid or the conjugate base (or bases) of the acid”                                                                                                                    |
| About                | 1, 26           | “approximately”                                                                                                                                                        |
| “aminosilane”        | 1, 26, 37       | “A compound having amine and silane functional groups.” Note: The aminosilane compound may be hydrolyzed (or partially hydrolyzed) and/or a condensed species thereof. |
| “phosphonium silane” | 1               | “A compound having phosphonium and silane functional groups.”                                                                                                          |

*See* Compl. Br. at 18-19; Resps. Br. at 18-19; Staff Br. at 36.

The administrative law judge has determined to adopt the parties’ proposed constructions for the four claim terms.

### **4. “A chemical mechanical polishing composition comprising” (Preamble of Independent Claims 1 and 26)**

Below is a chart showing the parties’ proposed claim constructions.

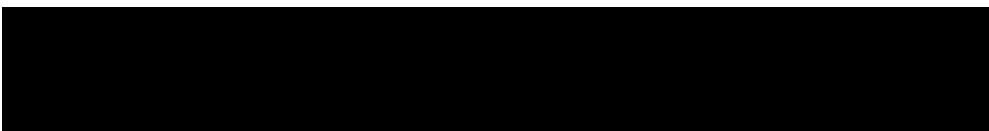


| <b>“A chemical mechanical polishing composition comprising”</b> |                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CMC’s Construction</b>                                       | <b>Respondents’ Construction</b> | <b>Staff’s Construction</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| [none]                                                          | [none]                           | <p>A composition combining mechanical abrasive particles and chemical additives, having utility for CMP applications rendering it suitable for polishing substantially any substrate at an industrial or commercial scale.</p> <p><u>Note:</u></p> <ul style="list-style-type: none"> <li>- The CMP composition may include any one or more of the chemical additives identified in the ‘721 patent specification. <i>See JX-0001</i> at 6:1–6, <i>id.</i> at 39:14–19; <i>id.</i> at 1:56–64; <i>id.</i> at 39:14–19.</li> <li>- The CMP composition may be used to polish substantially any substrate identified in the specification. <i>See id.</i> at 15:1–8; 39:1–19.</li> </ul> |

See Compl. Br. at 19–24; Resp. Br. at 28–29; Staff Br. at 62–65.

CMC argues, *inter alia*:

The Staff’s prehearing brief (for the first time) proposes a construction for the preamble of claims 1 and 26, a term neither CMC nor Respondents seeks to have construed. The Staff’s proposal imports multiple detailed limitations into the six words of the preamble: [1] an additional structural requirement of multiple “chemical additives,” and functional requirements that the composition is both [2] “suitable for polishing substantially any substrate” and [3] for polishing “at an industrial or commercial scale.” The limitations Staff seeks to add are not “broad” and “non-limiting,” as Staff implies. SPreHBr at 67 (citing *Innogenetics* for the proposition that a “broad, non-limiting” construction should be applied). To the contrary, Staff’s proposal takes straightforward



composition claims and turns them into hybrid composition/method claims that require additional unrecited **components** (e.g., additives and substrates, and even including “industrial scale”) and specific **uses** (e.g., suitable for commercial scale manufacture is claimed, but “lab-scale” production of the same composition is not). *Id.* at 68. This, then, does not broaden the independent claims; it fundamentally transforms and limits them. Respectfully, Staff’s proposal should be rejected on both procedural and substantive grounds.

Compl. Br. at 19-20.

The Staff makes the following four points:

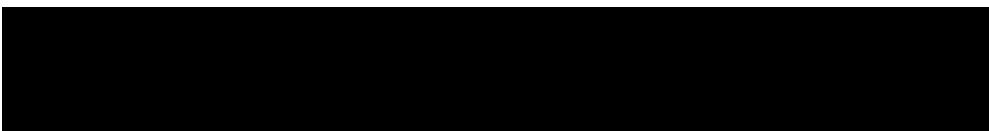
1. The Staff’s construction requires that a “chemical mechanical polishing composition” combines both mechanical abrasive particles and chemical additives, exactly as the plain claim language requires.
2. The Staff’s construction also requires that the claimed “chemical mechanical polishing” compositions are suitable for polishing various target substrates, consistent with the inventors’ explicit and repeated statements throughout the specification.
3. The Staff’s construction also requires that the claimed CMP compositions have desirable utility for CMP applications rendering them suitable for CMP processes at an industrial or commercial scale. Both the intrinsic and extrinsic evidence support such a requirement.
4. Finally, the Staff’s construction is supported by the extrinsic evidence, including technical treatises and CMC’s expert testimony.

Staff Br. at 63-65.

Respondents argue, in essence, that they agree with the Staff’s ultimate position.

Respondents’ argument in its entirety is as follows:

The proper construction of this term is relevant to the lack of the required written description and enabling disclosure for the full scope of the ’721 patent claims. Initially, no party proposed any construction of the preamble in the Joint Claim Construction statement. *See RX-1045* (11/17/20 Amended Joint Claim Construction chart). However, as the Staff Attorney has documented, CMC and its expert subsequently imbued the preamble with significant meaning to support its substantive position in this case. Staff PreHB at 65-68. For example, CMC read “commercially successful” into the preamble to distinguish slurries described in its own prior art publications as “particularly useful” in



polishing silicon oxide (RX-0025 (U.S. Pat. 7,944,057) at 10:61-63; RX-0230 (WO 2009/042073) at 14, ¶ 46), arguing that they were not commercially successful. CX-0004C (Dysard WS) QA 13-20.

Given the way CMC is reading its own claims in this regard, the law would require that the preamble, read by CMC as requiring a commercially optimized CMP slurry to support nonobviousness, would also require CMC to fully describe and enable production of commercially optimized CMP slurries for the full scope of its claims in order to satisfy the requirements of 35 U.S.C. §112. Claims are not a “nose of wax” to be twisted one way to prevail on a first issue and some other way to prevail on a second issue. *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996). As the Staff Attorney ably demonstrated at trial, CMC’s own reliance on the preamble, if successful, compels a conclusion of invalidity for failure to comply with at least the written description and enablement requirements of 35 U.S.C. §112. See § VIII.

Reps. Br. at 28-29.<sup>19</sup>

The substantive disputes regarding the preamble are: (1) whether the preamble is limiting and needs construction; and (2) whether the Staff’s proposed construction is proper. With respect to the first issue, the preamble of claims 1 and 26 is not limiting.<sup>20</sup>

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<sup>19</sup> As an initial matter, CMC argues, “As a procedural matter, Staff’s proposed construction of the preamble is untimely, as set forth in CMC’s pending motion to strike.” Compl. Br. at 20 (citing Motion Docket No. 1204-34 (EDIS Doc. ID No. 732291)). The administrative law judge agrees that the Staff’s proposed construction of the preamble is untimely. Nonetheless, the issue has been fully briefed, and in the interest of developing a full record, it is determined that the claim term should be construed. Motion No. 1204-34 is denied.

<sup>20</sup> CMC’s expert explained that the preamble “gives meaning” to the claims and, “based on [his] review of the entire ‘721 Patent specification,’ the ‘inventors intended to claim a chemical mechanical polishing composition used [or configured to achieve desirable performance] in CMP process applications (e.g., ILD applications).’ See CX-0229C (Dauskardt RWS) at Q/A 78; Dauskardt Tr. 715-717. Indeed, as Dr. Dauskardt explained at the hearing, “[y]ou would always look to the specification to see what the benefits of the composition are.” See Dauskardt Tr. 717, 702-704 (“It is a compositional claim,” so the preamble “tells you that is a CMP composition as opposed to … something else,” “it tells whoever is reading it that they are going to be learning about the CMP composition.”). The Federal Circuit requires more for a preamble to be found limiting. *Arctic Cat Inc. v. GEP Power Prod., Inc.*, 919 F.3d 1320, 1328 (Fed. Cir. 2019) (“[A] preamble is not limiting ‘where a patentee defines a structurally complete invention in the

[REDACTED]

The preamble—a “chemical mechanical polishing composition”—does not provide antecedent basis for terms in the body of the claim; “nor does it supply structure needed to make the body itself a ‘structurally complete invention.’” *Arctic Cat*, 919 F.3d at 1329 (determining that the preamble including “[a] personal recreational vehicle” is not limiting). Indeed, the claim term “chemical mechanical polishing composition” is “entirely conventional apart from the improvement in the body” of claims 1 and 26. *Id.* at 1329–1330.

For similar reasons, even if the term is determined to be limiting, it requires no further construction. The patent explains that “[c]hemical mechanical polishing compositions” “are well known in the art.” JX-0001 (‘721 Patent) at 1:54–56. Neither CMC’s expert, nor any one of Dupont’s four experts identified any ambiguity in the term. *See, e.g.*, RX-1076C (Raghavan WS) at Q/A 91 (recognizing well known meaning); CX-0229C (Dauskardt RWS) at Q/A 66 (same). Nor does anything in this “plain claim language” require the addition of “chemical additives,” as the Staff argues. *See* Staff Br. at 63 (“Chemical mechanical polishing is the core focus of the claimed invention that gives meaning and purpose to the elements recited in the body of the asserted claims, and the specification notes that in addition to the recited colloidal silica abrasive particles, chemical additives also play an important role in chemical mechanical polishing.”).

The claims already recite the essential chemical aspects—including an internal “chemical species” and “a water based liquid carrier” at an acidic pH and, for claim 26,

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claim body and uses the preamble only to state a purpose or intended use for the invention.””) (citations omitted). As Dr. Dauskardt testified, the words “a chemical mechanical polishing composition” merely indicates a CMP “composition claim,” and lists afterwards the “essential features of the invention.” *See* Dauskardt Tr. 756-757.

[REDACTED]

an “aminosilane” bonded to the particle surface. Moreover, for certain slurries, the abrasive particle itself can also “act as a chemical component” without any additional additives. *See* Dysard Tr. 110; Dauskardt Tr. 697 (chemical additives are generally optional), 723 (same).

Accordingly, inasmuch as the Staff’s “proposed construction erroneously reads limitations into the claims,” the construction need not be adopted. *ActiveVideo Networks, Inc. v. Verizon Commc’ns, Inc.*, 694 F.3d 1312, 1326 (Fed. Cir. 2012) (“The district court did not err in concluding that these terms have plain meanings that do not require additional construction.”); *U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997) (Claims are not to be construed for the mere purpose of replacing understandable claim language with new “construction” language, and courts need not construe claims as an “obligatory exercise in redundancy.”).

The other claims in the ‘721 patent do not support the Staff’s proposed construction. *Phillips*, 415 F.3d at 1314 (“Differences among claims can ... be a useful guide in understanding the meaning of particular claim terms.”). Several limitations in the Staff’s preamble construction are already recited in dependent claims. For example, claims 3, 20, 21, 24, 30, 45, and 46 each recites specific “chemical additives.” *See JX-0001* (‘721 Patent) at claims 3, 20, 21 (buffering agent), claims 24, 46 (silicon nitrogen polishing inhibitor), claim 30 (polycarboxylic acid and poly phosphonic acid), claim 45 (silicon nitride polishing accelerator). Other dependent method claims recite polishing specific “substrates” with specific performance levels. *Id.* at claims 39–43 (“silicon oxygen” substrate), claim 44 (“silicon oxygen” and “silicon nitride” substrates), claims 45–46 (TEOS and silicon nitride substrates). These claims show that “when the

[REDACTED]

inventor[s] wanted to restrict the claims to require the use of a “particular chemical additive or substrate, they “did so explicitly.” *Kara Tech. Inc. v. Stamps.com Inc.*, 582 F.3d 1341, 1347 (Fed. Cir. 2009).

The specification does not support the Staff’s construction, as it describes each of the Staff’s proposed limitations as additional components that may be used. For example, regarding the Staff’s proposal to require “chemical additives,” the Staff cites to portions of the ‘721 patent that state that such additives “may be incorporated into the claimed CMP compositions” (Staff Br. at 64 (citing JX-0001 at 1:38–64, 6:1–6, 39:14–19), and other portions of the specification expressly describe such additives as “optional” (JX-0001 at 10:29). Regarding the proposed requirement that the composition polish “substantially any substrate,” the Staff relies on a description of how a CMP slurry may be utilized in different applications. *See* Staff Br. at 64 (citing JX-0001 at 15:1–8, 39:1–19).

As for the requirement that the composition be suitable for “industrial and commercial” processes, the Staff relies only on the background description of a general need to reduce costs and increase throughput in CMP. *See* Staff Br. at 65 (citing JX-0001 at 1:65–2:11 (“The specification notes that “[t]here is a real need in the industry for CMP slurries that provide high throughput at reduced overall costs”—considerations relevant to industrial- or commercial- scale CMP rather than lab-scale research.”)). This is not lexicography or disavowal and does not justify reading limitations from the patent into the claims. *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014) (“We depart from the plain and ordinary meaning of claim terms based on the specification in only two instances: lexicography and disavowal.”); *see also Intel Corp. v.*

[REDACTED]

*ITC*, 946 F.2d 821, 836 (Fed. Cir. 1991) (“Where a specification does not *require* a limitation, that limitation should not be read from the specification into the claims.”) (quoting *Specialty Composites v. Cabot Corp.*, 845 F.2d 981, 987 (Fed. Cir. 1988)).

Finally, none of the extrinsic evidence cited by the Staff justifies departing from the term’s plain and ordinary meaning. *Phillips*, 415 F.3d at 1319. Treatises that discuss “chemicals” and “abrasive particles” (Staff Br. at 65) cannot justify reading the claims to require chemical additives that are expressly “optional” in the specification. The Staff also cites testimony from Dr. Dauskardt that a chemical additive may be required in a CMP composition. *Id.* at 68. As Dr. Dauskardt explained at the hearing, there is a difference between an operational CMP slurry that implements the “essential removal mechanism” of CMP—that is, which meets the limitations of the compositions as claimed—and a “real manufacturing slurry” in which “there would be other components.” See Dauskardt Tr. 711.

Accordingly, the administrative law judge has determined that the claim term “a chemical mechanical polishing composition comprising” should be given its plain and ordinary meaning, *i.e.*, “a chemical mechanical polishing composition comprising.”

**5. “colloidal silica abrasive particles” (Claims 1, 4–9, 15, 18–21, 23, 26, 28–29, 31–34, 38, 40–44)**

Below is a chart showing the parties’ proposed claim constructions.

| <b>“colloidal silica abrasive particles”</b>                                                                                                                                  |                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CMC’s and Staff’s Construction</b>                                                                                                                                         | <b>Respondents’ Construction</b>                                                                                                                 |
| “Colloidal silica abrasive particles that are prepared via a wet process rather than a pyrogenic or flame hydrolysis process which produces structurally different particles” | “silica particles prepared via a wet process rather than a pyrogenic or flame hydrolysis process that produces structurally different particles” |

*See* Compl. Br. at 24-25; Resp. Br. at 29; Staff Br. at 37-40.

The patent specification defines a similar term—“colloidal silica particles”—as “silica particles that are prepared via a wet process rather than a pyrogenic or flame hydrolysis process which produces structurally different particles.” JX-0001 (‘721 Patent) at 3:8–12. CMC’s and the Staff’s proposed construction also maintains the separate claim requirements that the particles are both “colloidal” and “abrasive” in nature, while respondents omit these express requirements. *See* Resp. Br. at 29.

A POSA would have understood from the claim language that the inventors were limiting the recited silica particles to those that are both colloidal and abrasive. These terms have well known meanings in the field. Abrasives are used to implement the fundamental removal mechanism of CMP. *See* JX-0001 (‘721 Patent) at 1:56–57 (“Polishing compositions (also known as slurries) for polishing dielectrics commonly use silica or ceria abrasives.”), 1:60–62 (“Polishing compositions for polishing metal layers...commonly include silica or alumina abrasives...”). Colloidal particles<sup>21</sup> are those “suspended in a liquid carrier (e.g., water)” (id. 3:6–8), as expressly recited in claims 1 and 26 (“colloidal silica abrasive particles dispersed in the liquid carrier”).

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<sup>21</sup> “Colloidal” particles have “at least one dimension within the nanometre ( $10^{-9}$  m) to micrometre ( $10^{-6}$  m) range.” *See* RX-0304 (Colloidal Science Book) at 10.

[REDACTED]

Respondents argue that “‘colloidal silica particles’ is an expressly defined term in the ’721 patent,” and that “Respondents’ proposed construction directly tracks this definition and should be adopted.” Resps. Br. at 29. Respondents also argue that the parties’ proposed constructions transform the composition claims into product-by-process claims:

This term is a “product-by-process” limitation. *E.g., Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 158 n.\* (1989) (product-by-process claim is one in which the claimed product “is defined at least in part in terms of the method or process by which it is made”) (citation omitted). Acknowledgement that the term is a product-by-process limitation is relevant to the inventorship issue because Fuso developed and conducted this claimed process step for most, if not all, of the ’721 patent examples. *See* § XII.

*See* Resps. Br. at 29.

Respondents’ claim construction position is not supported. All parties’ constructions expressly specify that the recited “wet process” “produces structurally different particles;” the particles therefore should be interpreted in their structural sense.

*See 3M Innovative Props. Co. v. Avery Dennison Corp.*, 350 F.3d 1365, 1371–72 (Fed. Cir. 2003) (“Words of limitation that can connote with equal force a structural characteristic of the product or a process of manufacture are commonly and by default interpreted in their structural sense, unless the patentee has demonstrated otherwise.”).

As in *3M*, there is no reason to depart from that default rule here. A POSA would have clearly understood that colloidal silica is structurally distinct from other types of silica particles, such as fumed silica, and the term does not restrict the claimed particles to those produced by a particular method. *See CX-0006C* (Dauskardt WS) at Q/A 52; *see also Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1329 (Fed. Cir. 2003)

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(“Each of these limitations only excludes human EPO from specific sources and does not restrict the claimed EPO to that produced from any particular source or by any particular method.”).

Accordingly, the administrative law judge has determined that the claim term “colloidal silica abrasive particles” should be construed to mean “colloidal silica abrasive particles that are prepared via a wet process rather than a pyrogenic or flame hydrolysis process which produces structurally different particles.”

**6.     “permanent positive charge of at least [15 or 13] mV”  
(Claims 1, 19–21, 26, 28, 38)**

Below is a chart showing the parties’ proposed claim constructions.

| <b>“permanent positive charge of at least [15 or 13] mV”</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CMC’s and Staff’s Construction</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Respondents’ Construction</b>                                                                                                                   |
| <p>“positive charge of at least [15 or 13] mV that is not readily reversible, for example, via flushing, dilution, filtration, and the like.”</p> <p>Note: The recited permanent positive charge values are measured according to the three step procedure described at column 11 of the ‘721 Patent specification: “A permanent positive charge of a specified value [at least N mV] means that the zeta potential of the colloidal silica particles remains above that specified value after the following three step filtration test: A volume of the polishing composition (e.g., 200 ml) is filtered through a Millipore Ultracell regenerated cellulose ultrafiltration disk (e.g., having a MW cutoff of 100,000 Daltons and a pore size of 6.3 nm). The remaining dispersion (the approximately 65 ml of dispersion that is retained by the ultrafiltration disk) is collected and replenished with pH adjusted deionized water. The deionized water is pH adjusted to the original pH of the polishing composition using a suitable inorganic acid such as nitric acid. This procedure is repeated for a total of three filtration cycles. The zeta potential of the triply filtered and replenished polishing composition is then measured and compared with the zeta potential of the original polishing composition. This three step filtration test is further illustrated by way of example in Example 10 of the ‘721 Patent.”</p> | <p>“a zeta potential of at least [15 or 13] mV that is not readily reversible, for example, via flushing, dilution, filtration, and the like.”</p> |

*See* Compl. Br. at 25-28; Resps. Br. at 29-31; Staff Br. at 41-43.

The parties agree that the claim term “permanent positive charge” is a new term that appears for the first time in the ‘721 patent and is defined in the ‘721 patent. *See* Compl. Br. at 26; Resps. Br. at 30. The parties dispute the substance and scope of the express definition of “permanent positive charge.” CMC and the Staff propose that the term “permanent positive charge of at least [15 or 13] mV” should mean “positive charge of at least [15 or 13] mV that is not readily reversible, for example, via flushing, dilution, filtration, and the like,” where the recited permanent positive charge values are measured according to the three step test described at column 11 of the ‘721 patent specification.

[REDACTED]

Respondents' proposal omits the three-step test for measuring permanent positive charge, thereby selectively truncating the express definition, and replaces the term "positive charge" with the term "zeta potential." CMC's and the Staff's proposed construction is consistent with the specification.

First, the three step filtration test is part of the express definition in the specification. *See JX-0001 ('721 Patent) at 11:4–6 ("By permanent positive charge it is meant that the positive charge on the silica particles is not readily reversible, for example, via flushing, dilution, filtration, and the like."); 11:14–31 ("Notwithstanding, as used herein, a permanent positive charge of at least 6 mV means that the zeta potential of the colloidal silica particles remains above 6 mV after the following three step filtration test..."). A POSA would have understood these statements to provide an express definition that delineates the scope of the claims to require permanent positive charge be measured by the recited test. See CX-0006C (Dauskardt WS) at Q/A 54; see also *Braintree Labs., Inc. v. Novel Labs., Inc.*, 749 F.3d 1349, 1356 (Fed. Cir. 2014) (finding that the part of the specification stating "The terms 'clinically significant' as used herein are meant to convey..." to be a clear definition and holding "[u]nder our precedent, the patentee's lexicography must govern the claim construction analysis. Therefore, we disagree with the district court's modification of the clear language found in the specification.") (citations omitted).*

Second, respondents replace the term "positive charge" in the inventors' definition with the term "zeta potential" without referring to the three-step filtration test that precedes measuring zeta potential in that definition. Respondents' proposal is based on the conclusory opinions of their expert. *See* Resps. Br. at 30; RX-1075C (Miller WS)

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at Q/A 40–42; RX-1401C (Miller RWS) at Q/A 25–32 (no explanation for replacement); CX-0006C (Dauskardt WS) at Q/A 68; *Renishaw PLC v. Marposs Società per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998) (“The other clear point provided by these two canons covers the situation in which a patent applicant has elected to be a lexicographer by providing an explicit definition in the specification for a claim term. In such a case, the definition selected by the patent applicant controls.”).

Accordingly, the administrative law judge has determined that the claim term “permanent positive charge of at least [15 or 13] mV” should be construed to mean “positive charge of at least [15 or 13] mV that is not readily reversible, for example, via flushing, dilution, filtration, and the like.”

**7.     “wherein the colloidal silica abrasive particles have a permanent positive charge of at least [15 or 13] mV”  
(Claims 1, 19–21, 26, 28, 38)**

Below is a chart showing the parties’ proposed claim constructions.

| <b>“wherein the colloidal silica abrasive particles have a permanent positive charge of at least [15 or 13] mV”</b>                                    |                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CMC’s and Staff’s Construction</b>                                                                                                                  | <b>Respondents’ Construction</b>                                                                                                                                                           |
| “The colloidal silica abrasive particles in the chemical mechanical polishing composition have a permanent positive charge of at least [15 or 13] mV.” | “A permanent positive charge of at least [13 or 15] mV results from the colloidal silica abrasive particles incorporating one or more nitrogen or phosphorous containing chemical species” |

*See* Compl. Br. at 28-37; Resps. Br. at 19-29; Staff Br. at 51-55, 66-69.

There are two disputes regarding this claim term. The first relates to what sources of permanent positive charge should be included in the measurement. Respondents would read a functional requirement into the term requiring that the recited “permanent

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positive charge” values “result[] from” the internal chemical species alone. CMC proposes, and the Staff appears to agree, that the permanent positive charge should be measured as the particles exist in the “chemical mechanical polishing composition” as claimed, and should cover charge from the internal chemical species as well as charge from any aminosilane bonded to the external particle surface.

The second dispute relates to whether the particles must be divided into sub-populations for purposes of the permanent positive charge measurement. Respondents and the Staff appear to argue that permanent positive charge must be measured based on a sub-population of particles in the Accused Products.

**Whether the claim covers permanent positive charge from internal chemical species and externally bonded aminosilane**

Claim 26 in particular requires two sources of permanent positive charge—an internally incorporated chemical species [26c] and an externally bonded aminosilane [26f]. Although claim 1 does not separately recite an externally bonded aminosilane, it does not exclude use of such aminosilane bonding. The “permanent positive charge” term in both claims should therefore be construed to account for both acknowledged sources of permanent charge (internally incorporated and externally bonded). *Phillips*, 415 F.3d at 1314 (“[C]laim terms are normally used consistently throughout the patent.”).

The specification states that a “permanent positive charge may be the result of incorporating the positive charged species in the particle” and “may further result from a covalent interaction between the particle and a positively charged species... [i.e., external surface treatment]” JX-0001 at 11:6–10; *see also* JX-0001 at 11:45–48 (“Components that are in the particle or are strongly associated (e.g., covalently bonded) with the

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particle surface remain with the particle such that there tends to be little if any change in the positive zeta potential thereof.”), 7:33–37 (“Positively charged colloidal silica abrasive particles may alternatively be obtained via incorporating a positively charged chemical species into the abrasive particles and then further bonding (via surface treating) the same or a different chemical species to the particle surface.”).

Dr. Dauskardt explained that the “sources” of positive charge in the claims include “the chemical species incorporated in the colloidal silica abrasive particles and also the aminosilanes that are bounded to the outer surface of the particle.” Dauskardt Tr. 235; CX-0006C (Dauskardt WS) at Q/A 68. Respondents’ expert, Dr. Klein, also admitted that the specification does “not indicate that the threshold value comes from inside,” Klein Tr. 432, and does say that “there are species that could be covalently bonded to the surface and they would further increase the positive charge” and “because they are bonded to the surface, they’re permanent.” *See* Klein Tr. 431, 429.

Respondents’ proposed construction seeks to import a functional requirement that is not otherwise recited in the claim. In these circumstances, the Federal Circuit’s case law is clear: “[w]here the function is not recited in the claim itself by the patentee, we do not import such a limitation.” *Ecolab, Inc. v. Envirochem, Inc.*, 264 F.3d 1358, 1367 (Fed. Cir. 2001). Respondents cite no authority for their contrary position. *See* Resp. Br. at 20; Joint Reply Outline at 2; Resp. Reply Br. at 1-8. The *Altiris* case cited by respondents addresses the entirely different issue of “determining if the steps of a method claim that do not otherwise recite an order[] must nonetheless be performed in the order in which they are written.” *Altiris, Inc. v. Symantec Corp.*, 318 F.3d at 1363, 1369–1370 (Fed. Cir. 2003). Likewise, the claims at issue in *K-2 Corp.* involved the issue of

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whether functional language expressly recited in the claim dictates the meaning of the element preceding it. *See K-2 Corp. V. Salomon S.A.*, 191 F.3d 1356, 1363–64 (Fed. Cir. 1999).<sup>22</sup> Neither situation is present here, where the claims do not expressly recite the functional requirement respondents’ construction imposes.

The “function” that respondents seek to add—“that the claimed minimum permanent positive charge of 13 or 15 mV ‘results from’” only the internal nitrogen or phosphorous chemical species—does not actually reflect the function of the internal chemical species described in the specification. *See* Resps. Br. at 20, 22. For example, the specification describes that “prior to the surface treatment” the zeta potential of particles “may be less than 15 mV (e.g., less than 13 mV or less than 10 mV) at a pH of 4.” *See* JX-0001 (‘721 Patent) at 7:62–67. These particles are then combined with an “aminosilane compound bonded to the surface” (*id.*), which Dr. Dauskardt explained “would get you above the threshold.” Dauskardt Tr. 237; Klein Tr. 432 (respondents’ expert also conceding that the “patent specification also discloses embodiments with internal chemical species and external surface treatment where zeta potential of the particles prior to the surface treatment is less than that threshold value.”). The benefit of this structure is that “you are moving some of the charge to the interior and you don’t

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<sup>22</sup> *Kaken Pharm. Co., Ltd. v. Iancu*, 952 F.3d 1346, 1352 (Fed. Cir. 2020) and *Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1319 (Fed. Cir. 2005) stand for the proposition that the invention’s purpose can be considered during claim construction, not that that function must be imported into a structural claim. *See* Resps. Br. at 22. Indeed, the *Medrad* Court acknowledged the widely accepted and “unremarkable proposition” that “where a function ‘is not recited in the claim itself by the patentee, we do not import such a limitation.’” *Medrad*, 401 F.3d at 1319 (citing *Ecolab*). In any event, as described below, respondents do not correctly describe the function.

[REDACTED]

have to put as much charge on the surface” and “you get these advantages of having more of the surface available for the chemical-mechanical planarization.” Dauskardt Tr. 238.

Example 15 provides a working example, disclosing a composition in which the colloidal silica particles had a zeta potential of 10 or fewer mV before surface treatment, and a zeta potential of well over the claimed 15 mV threshold after surface treatment.

*See JX-0001 ('721 Patent) at 32:57–33:42 (compositions 15D-15G); CX-0229C (Dauskardt RWS) at Q/A 95; Tr. 761-762 (compositions 15I and 15J have zeta potential of 5 and 10 mV before surface treatment, and then surface treatment in compositions in 15D, E, G increases zeta potentials to above 26 mV); Klein Tr. 456 (“[P]olishing compositions 15D, 15E, 15F, and 15G … all have internal EOPA and an external aminosilane surface treatment.”). Respondents’ expert, Dr. Klein, acknowledged that particles with this structure would be expected to have permanent positive charge. Klein Tr. 456 (testifying that “when [the surface treatment described in Example 15] goes through the three-step filtration or washing process … it won’t wash off.”).*

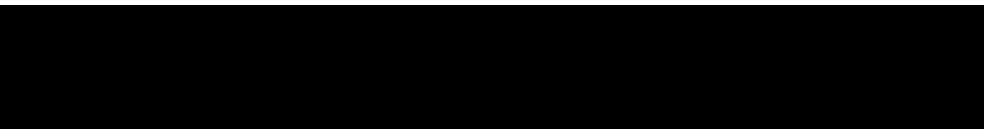
Respondents admit that these are embodiments “to which claim 26 of the patent refers” (Resps. Br. at 24) but argue that a “skilled reader” would nonetheless ignore these teachings and interpret the claim to require that all the “permanent positive charge” comes from the internal species inasmuch as the “chemical species’ limitation appears in the claim “before” the reference to aminosilane bonding. *Id.* at 17–18; *see also* Klein Tr. 433 (“Q. [T]here is a timing and an ordering, you think, that’s required here? A. That’s my understanding.”). Indeed, respondents’ expert, Dr. Klein, acknowledged that it would not be possible to measure the permanent positive charge of compositions practicing claim 26 under respondents’ claim construction without using a contrived procedure not

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described in the specification or recited in the claims. Klein Tr. 433 (“[W]hen the particle has both internal chemical species and surface treatment, the zeta potential measurements cannot be attributable to only the internal chemical species.”), Klein Tr. 434 (“I would have to test it before it was surface treated and after its surface treated.”).

This reading, however, is incorrect. A composition is a mixture, not a recipe or set of ordered steps for making the composition. *Exxon Chem. Patents, Inc. v. Lubrizol Corp.*, 64 F.3d 1553, 1557–58 (Fed. Cir. 1995) (“Exxon claims a product, not merely a recipe for making whatever product results from the use of the recipe ingredients. This conclusion respects that which is claimed, namely a chemical composition.”); *Baldwin Graphic Sys., Inc. v. Siebert, Inc.*, 512 F.3d 1338, 1344 (Fed. Cir. 2008) (“Courts must generally take care to avoid reading process limitations into an apparatus claim because the process by which a product is made is irrelevant to the question of whether that product infringes a pure apparatus claim.”) (citations omitted); *see also* Tr. 236 (“This is a composition claim. It’s a series of ingredients. It doesn’t matter which order you put them in.”).

Thus, respondents’ argument that “[t]here is no reasonable interpretation of this supporting written description other than that the minimal 15 mV positive charge **results from** the internally incorporated species” (Resps. Br. at 22) is incorrect and improperly excludes preferred embodiments of the asserted claims. *See GE Lighting Sols., LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1311 (Fed. Cir. 2014) (“[W]here claims can reasonably [be] interpreted to include a specific embodiment, it is incorrect to construe the claims to exclude that embodiment, absent probative evidence on the contrary.”).



**Whether the term does not require measurement of individual particle components before they are added to the composition**

Permanent positive charge is a characteristic of colloidal silica abrasive particles in a polishing composition at a specific pH and thus can be measured across all the particles of a polishing composition. This is reflected in the claims, which recite a composition with colloidal silica abrasive particles at a specific pH of the polishing composition (JX-0001 ('721 Patent) at claims 1, 26) and is also described throughout the specification. *See* JX-0001 ('721 Patent) at 10:38–39 (“The colloidal silica abrasive particles may optionally have a permanent positive charge in the polishing composition.”). Indeed, the required “three step filtration test” for “permanent positive charge” is described as being performed on a “volume of the polishing composition.” Id. at 11:14–17, 11:27–28 (“The zeta potential of the triply filtered and replenished polishing composition is then measured and compared with the zeta potential of the original polishing composition.”).

The Staff and respondents, on the other hand, would require that individual particles be measured separate and apart from the polishing composition depending on whether a specific particle does or does not include an internal chemical species. *See* RX-1401C (Miller RWS) at Q/A 50–54; Resps. Br. at 24–25; Staff Br. at 68. This approach distorts the claim. Under respondents’ theory, to prove infringement, the patentee would have to obtain a single ingredient of an infringing product, assemble that ingredient into a CMP composition, and then measure that new product. However, the claims recite a composition, not a method of manufacture.

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The Staff’s and respondents’ position appears to stem from an assumption that internal “chemical species” (and therefore “permanent positive charge” too, for consistency) must be measured on a particle-by-particle basis, removing any particle that may lack that species before measurement. Nothing in the patent, however, supports such a restrictive reading. The claim simply states that that same group of particles must be measured to have both an internally-incorporated chemical species and a permanent positive charge in the claimed range—it does not concern itself with a particle-by-particle assessment of the source of the chemical species within the group. Indeed, given the uniform nature of nanoparticles (as shown for example in the patent’s Figure), this would be difficult.

The dependent claims and specification provide additional support for this understanding. Indeed, the patent expressly allows for the possibility that the internal chemical species may only “become incorporated into at least a portion of the colloidal silica particles during growth thereof”—*i.e.*, a portion of the population of particles in the polishing composition, but perhaps not all. *See JX-0001 (‘721 Patent)* at 5:21–41; *see also id.* at 7:33–55; CX-0006C (Dauskardt WS) at Q/A 73. That only means that the particles in the composition may have a lower concentration of nitrogen across the full population, not that a “smaller sub-population” of particles must be considered and measured. It is apparent throughout the intrinsic record that the chemical species is measured as a concentration of all the particles in the polishing composition, not just of some sub-population confirmed to be the source of that species. For example, dependent claim 22 requires a level of chemical species as measured as a concentration of particles.

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*See id.* at claim 22 (“the colloidal silica abrasive particles include 0.20 or more weight percent nitrogen”).

The specification also repeatedly states that chemical species are measured as a concentration—measured as a molar ratio—of chemical species to silica in the chemical species in a composition. *See e.g., id.* at 3:66-4:3 (“a molar ratio of the chemical species to silica in the colloidal silica abrasive particles...” and measuring chemical species as a concentration). Indeed, the method of measuring “chemical species” described in the patent is to dissolve the entire polishing composition into a mass and measure a “[n]itrogen level” as a concentration for all the particles in the “polishing composition.”

*See JX-0001* (‘721 Patent) at 21:7–22 (Table 2 reporting “Nitrogen level” as a concentration of nitrogen in a “Polishing Composition), 20:48–53 (dissolving all particles in the composition).

Accordingly, the administrative law judge has determined that the claim term “wherein the colloidal silica abrasive particles have a permanent positive charge of at least [15 or 13] mV” should be construed to mean “the colloidal silica abrasive particles in the chemical mechanical polishing composition have a permanent positive charge of at least [15 or 13] mV.”

**8.     “a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof”  
(Claims 1 and 26)**

Below is a chart showing the parties’ proposed claim constructions.

| <b>“a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof”</b>                                                                                                                                                                                                                                                                                                                        |                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CMC’s and Staff’s Construction</b>                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Respondents’ Construction</b>                                                                                                            |
| <p>“The recited chemical species is incorporated sub-surface in the interior of the colloidal silica abrasive particles”</p> <p><u>Note:</u> In addition, a portion of the recited chemical species may also be at or near the particle surface (such that the chemical species is both internal to and at the surface).</p> <p>The claims may further include additional, unrecited chemical species outside the scope of this limitation.</p> | <p>“the colloidal silica abrasive particles contain within, including at or near, their external surfaces one or more chemical species”</p> |

*See* Compl. Br. at 37-38; Resp. Br. at 31-35; Staff Br. at 44-46.

Respondents have proposed that a number of phrases be construed in the “chemical species” limitation of claims 1 and 26. The first dispute is as to the meaning of “incorporated...internal to an outer surface thereof.” *See* Resp. Br. at 31. This phrase should be construed to be consistent with its plain meaning and use in the specification, which relates to the “sub-surface in the interior of the colloidal silica abrasive particles.”

JX-0001 (‘721 Patent) at 5:21–41; *see also id.* at 3:23–26; CX-0006C (Dauskardt WS) at Q/A 57. Respondents’ proposed construction is incorrect because it renders the term “internal” superfluous by broadening the claim to include chemical species that are found only at the particle surface, but not necessarily underneath the surface. *See* RX-1073C (Klein WS) at Q/A 53. Claims are interpreted in order to give meaning to all of their terms. *Elekta Instrument S.A. v. O.U.R. Scientific Int’l, Inc.*, 214 F.3d 1302, 1305–07 (Fed. Cir. 2000) (refusing to adopt a claim construction which would render claim

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language superfluous); *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 950 (Fed. Cir. 2006) (Claims must be “interpreted with an eye toward giving effect to all terms in the claim.”).

The specification discloses that, “[w]hile the chemical species is incorporated internally in the colloidal silica abrasive particles, it will be understood that a portion of the chemical species may be at or near the particle surface (such that the chemical species is both internal to the surface and at the surface).” *See JX-0001* (‘721 Patent) at 5:21–41. This description reinforces that a chemical species must be at least sub-surface but also can be at the particle surface, as reflected in CMC proposed construction—not that those two terms refer to the same position, as respondents propose. *See CX-0006C* (Dauskardt WS) at Q/A 57.

Accordingly, the administrative law judge has determined that the claim term “a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof” should be construed to mean “the recited chemical species is incorporated sub-surface in the interior of the colloidal silica abrasive particles.”

9.     **“a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof wherein the chemical species is a nitrogen containing compound or a phosphorus containing compound...”**  
**(Claims 1 and 26)**

Below is a chart showing the parties’ proposed claim constructions.

| <b>"a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof wherein the chemical species is a nitrogen containing compound or a phosphorus containing compound..."</b> |                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CMC's and Staff's Construction</b>                                                                                                                                                                                          | <b>Respondents' Construction</b>                                                                                                                             |
| <p>"The recited chemical species is a compound that contains nitrogen or phosphorous."</p> <p>Note: The claims may further include additional, unrecited chemical species outside the scope of this limitation.</p>            | <p>"the colloidal silica abrasive particles contain within, including at or near, their external surfaces one or more nitrogen and phosphorus compounds"</p> |

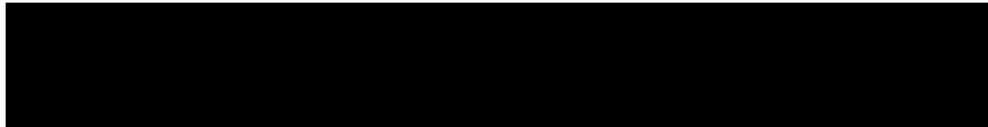
*See* Compl. Br. at 38; Resp. Br. at 31-35; Staff Br. at 46.

Respondents briefed this claim term and the previous and the following claim terms together. *See* Resp. Br. at 31-35. There does not currently appear to be a separate dispute regarding this term requiring resolution. *See id.* at 32 ("the parties seem to agree are nitrogen or phosphorus containing compounds").

Accordingly, the administrative law judge has determined that the claim term "a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof wherein the chemical species is a nitrogen containing compound or a phosphorus containing compound" should be construed to mean "the recited chemical species is a compound that contains nitrogen or phosphorous."

10. **"a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof wherein the chemical species is a nitrogen containing compound or a phosphorus containing compound... wherein the chemical species is not an aminosilane or a phosphonium silane" (Claim 1)**

Below is a chart showing the parties' proposed claim constructions.



| <b><u>“a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof wherein the chemical species is a nitrogen containing compound or a phosphorus containing compound... wherein the chemical species is not an aminosilane or a phosphonium silane”</u></b> |                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CMC’s and Staff’s Construction</b>                                                                                                                                                                                                                                                                            | <b>Respondents’ Construction</b>                                                                                                                                                                                            |
| <p>“The recited chemical species is neither an aminosilane nor a phosphonium silane.”</p> <p>Note: The claims may further include additional, unrecited chemical species outside the scope of this limitation.</p>                                                                                               | <p>“the colloidal silica abrasive particles contain within, including at or near, their external surfaces one or more nitrogen and phosphorus compounds but do not contain aminosilane or phosphonium silane compounds”</p> |

*See* Compl. Br. at 38-40; Resp. Br. at 31-35; Staff Br. at 47-51.

For the reasons discussed below, the administrative law judge has determined that the claim term “wherein the chemical species is not an aminosilane or a phosphonium silane” should be construed to mean “the recited chemical species is neither an aminosilane nor a phosphonium silane.”

This claim term appears only in claim 1. The dispute relates to the claim phrase “the chemical species is not an aminosilane or a phosphonium silane” and whether it should be interpreted to mean that the particles as a whole do not contain any aminosilane or a phosphonium silane, as respondents propose.

As the claim states, it is “the” previously recited chemical species that cannot be aminosilane or phosphonium silane. Consistent with “comprising” claims, the claim imposes no restrictions on other chemical species that may exist in the particle. *See CX-0006C* (Dauskardt WS) at Q/A 60–65; *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 811 (Fed. Cir. 1999) (“The signal ‘comprising’ implements the general rule that absent some special circumstance or estoppel which excludes the additional factor,

[REDACTED]

infringement is not avoided by the presence of elements or steps in addition to those specifically recited in the claim.”).

Respondents do not identify any special circumstances that justify departing from the claim language or standard principles of claim construction. *See* Resp. Br. at 31-35. In fact, respondents’ position appears to conflict with the opinion of their own expert, Dr. Klein, who agrees that “yes,” the claim “can include other species that aren’t even recited in this claim.” Klein Tr. 423.

The ‘721 patent specification discloses embodiments that includes two or more different chemical species: “[i]t will be understood that the colloidal silica abrasive particles may include two or more of the above described chemical species incorporated in the particles,” including an aminosilane species and a non-aminosilane species, such as a quaternary amine JX-0001 (‘721 Patent) at 4:59–65. Example 13 of the ‘721 patent provides a working example of that structure, describing a particle that contains both 3-ethyloxypropylamine (“EOPA”—which is a non-aminosilane nitrogen containing compound—and an aminosilane. *See* JX-0001 (‘721 Patent) at 30:19–43 (Example 13 describing EOPA and APTMS, an aminosilane), 32:36–42 (confirming that EOPA is incorporated using the process of Example 13); CX-0006C (Dauskardt WS) at Q/A 62. This embodiment is covered by Claim 1 because one chemical species—the EOPA—is not an aminosilane. *See* CX-0006C (Dauskardt WS) at Q/A 62.

The *Jeneric/Pentron* case cited by respondents dealt with a plaintiff trying to change and expand the claim, interpreting a range of 0–1% to cover a product containing 1.61% of material). *See* Resp. Br. at 34 (citing *Jeneric/Pentron, Inc. v. Dillon Co., Inc.*, 205 F.3d 1377 (Fed. Cir. 2000)). It appears that respondents are expanding claim

[REDACTED]

language and seeking to apply to the entire particle a negative limitation that expressly applies only to the chemical species.

Respondents do not provide support for their argument that the existence of other related CMC patents that do claim particles with aminosilanes somehow means that the particles of claim 1 contain no species that is an aminosilane. *See* *Resps. Br.* at 34-35. The cases cited by respondents do not support their argument. Those cases state that different claims can be directed to different embodiments. *Id.* Respondents do not support their opinion that a limitation requiring a non-aminosilane species is somehow not supported by embodiments that include both aminosilane and non-aminosilane. *See CollegeNet, Inc. v. ApplyYourself, Inc.*, 418 F.3d 1225, 1235 (Fed. Cir. 2005) (assessing claims reciting actions to be performed “automatically” and concluding that “the use of ‘comprising’ suggests that additional, unrecited elements are not excluded. Such elements could include human actions...This construction does not read ‘automatically’ out of the claims, as *ApplyYourself* suggests, because a machine still performs the claimed functions without manual operation, even though a human may initiate or interrupt the process.”).

Finally, the portion of the file history recited by the respondents does not support their position and certainly does not meet the “exacting” standard required to limit the claim scope. *See* *Resps. Br.* at 35; *Continental Circuits LLC v. Intel Corp.*, 915 F.3d 788, 798 (Fed. Cir.), *cert. denied*, 140 S. Ct. 648, 205 L. Ed. 2d 390 (2019) (holding “absent ‘clear and unmistakable’ language suggesting otherwise, we conclude that the aforementioned statements do not meet the ‘exacting’ standard required to limit the scope of the claims to a repeated desmear process”) (citing *Thorner v. Sony Computer Entm’t*

[REDACTED]

*Am. LLC*, 669 F.3d 1362, 1367 (Fed. Cir. 2012)).

Specifically, respondents rely on applicants' statement during prosecution that the Fu reference "does not exclude an aminosilane or phosphonium silane, as required by the pending claims." *See* Resp. Br. at 35 (citing CX-0222 (Certified File History of '721 Patent), 5/18/2016 Applicant Response at 308). The sentence portion quoted by respondents by itself is ambiguous as it paraphrases, but does not recite, the language of any particular claim.

For context, the relevant paragraph is reproduced below:

Applicants respectfully disagree. Fu teaches a CMP composition including colloidal silica particles having a permanent positive charge of at least 6 mV. Fu teaches that a permanent positive charge may result, for example, from a covalent interaction between the particle and the cationic compound and is in contrast to a reversible positive charge that may result, for example, of an electrostatic interaction between the particle and the cationic compound. Fu then describes how to determine a permanent positive charge. Fu states that components that are strongly associated with the particle surface remain on the surface such that there tends to be little if any change in the positive zeta potential of the particle. Fu does not teach a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof. Furthermore, Fu teaches that the cationic compound may include a metal cation, a nitrogen-containing compound such as an amine, or a phosphonium compound. Fu does not teach amine compounds incorporated in the colloidal silica abrasive particles internal to an outer surface thereof, and does not exclude an aminosilane or phosphonium silane, as required by the pending claims.

CX-0222 (Certified File History of '721 Patent), 5/18/2016 Applicant Response at 308.

Read in context, the statement quoted by respondents, which refers to the "chemical species" limitation and limits the opinion to that limitation: "Fu does not teach a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof." *Id.* These statements made in the above paragraph fall short of "a clear and unmistakable disclaimer" of the plain claim language. *See Thorner*, 669 F.3d at 1367.

[REDACTED]

Accordingly, the administrative law judge has determined that the claim term “wherein the chemical species is not an aminosilane or a phosphonium silane” should be construed to mean “the recited chemical species is neither an aminosilane nor a phosphonium silane.”

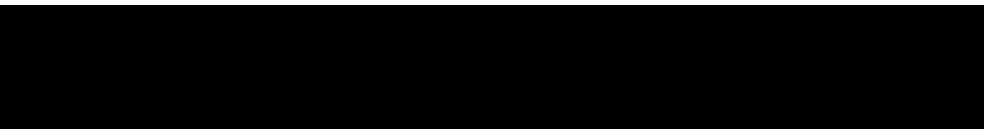
**11. “bonded with the outer surface of the colloidal silica abrasive particles” (Claim 26)**

Below is a chart showing the parties’ proposed claim constructions.

| <b>“bonded with the outer surface of the colloidal silica abrasive particles”</b>                    |                                                                                         |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| <b>CMC’s and Staff’s Construction</b>                                                                | <b>Respondents’ Construction</b>                                                        |
| Plain and ordinary meaning; the language of this limitation reflects its plain and ordinary meaning. | “chemically bonded onto the external surface of the colloidal abrasive silica particle” |

*See* Compl. Br. at 41-43; Resps. Br. at 35-36; Staff Br. at 58-62.

For this term, respondents propose to change the plain claim language, *e.g.*, replacing the term “bonded with” with “bonded onto,” while CMC and the Staff propose to keep the term’s plain meaning. *See* Resps. Br. at 35-36. The complete phrase, “wherein an aminosilane compound is bonded with the outer surface of the colloidal silica abrasive particles,” describes a structural feature of the colloidal silica abrasive particles. CMC submits that respondents’ proposed revision of the claim language is an improper attempt to limit the claims to one way of achieving the claimed structure to create an argument that the DI Products do not practice claim 26. This construction does not find support in the intrinsic evidence.



First, there is nothing ambiguous about the term “bonded with the outer surface.”

A POSA would have understood this term to cover various ways to arrive at an aminosilane compound bonded with the surface of the colloidal silica abrasive particles, including treatment of the surface of a particle with an aminosilane compound after it is formed and modification of the surface of a particle through a particle growth process that includes an aminosilane compound. *See CX-0006C* (Dauskardt WS) at Q/A 82.

Second, respondents identify no support in the specification for limiting the claims to just one way of bonding an aminosilane compound with the particle surface.

*See* Resp. Br. at 36 (“The supporting patent disclosure refers to bonded to the outer surface as resulting from subsequent treatment onto the surface of a pre-formed particle.”). The ‘721 patent describes both treatment of the surface of a particle after it is formed (respondents’ proposal) and modification of the surface of a particle through the particle growth process. *See CX-0006C* (Dauskardt WS) at Q/A 82; JX-0001 (‘721 Patent) at 30:19–43 (bonding with surface through growth process), 28:22–26 (surface treatment after particle is formed). Indeed, the method of modifying a particle’s surface during growth is described in detail in Example 13, which is also referenced in numerous other examples. *See CX-0006C* (Dauskardt WS) at Q/A 82; JX-0001 (‘721 Patent) at 19:31 (Example 1), 22:39 (Example 4), 24:3 (Example 6), 29:66 (Example 11), 29:51 (Example 12). Respondents’ proposal would improperly exclude this embodiment.

Moreover, the inventors used the terms “bonded with” and “bonded to” in different contexts. “Bonded with” is used in the patent to refer generally to any method of surface bonding. *See e.g.*, JX-0001 (‘721 Patent) at 11:45–48 (“Components that are in the particle or are strongly associated (e.g., covalently bonded) with the particle

[REDACTED]

surface remain with the particle such that there tends to be little if any change in the positive zeta potential thereof.”); *see also id.* at 2:33, 16:35. “Bonded to” is used to refer to specific structures. *Id.* at 28:23 (describing Example 10B), 32:59 (Example 15), 41:48 (claim 25). Of these two phrases, the inventors selected one—“bonded with”—for claim 26. Respondents’ proposal does not give effect to these selected terms. *See K-2 Corp.*, 191 F.3d at 1364 (“Courts do not rewrite claims; instead, we give effect to the terms chosen by the patentee.”).

Respondents also propose to modify the claim language by changing “bonded” to “chemically bonded,” in order to distinguish other types of weak associations, including “electrostatic attraction.” *See* Resps. Br. at 35 (“Construing the term, as proposed by DuPont, to require ‘chemically bonded’ follows from the specification, which distinguishes irreversible chemical bonding (e.g., ‘covalent interaction’ or ‘covalent bonding’) that leads to a permanent positive charge from reversible weak associations (e.g., electrostatic attraction) that do not.”). The word “bonded” already distinguishes such weak associations. *See, e.g.*, JX-0001 (‘721 Patent) at 11:45–55 (distinguishing components that are “strongly associated (e.g., covalently bonded)” with the particle surface—from components that “have a weaker association (e.g., an electrostatic interaction)”). For this additional reason, respondents’ construction is not correct.

Accordingly, the administrative law judge has determined that the claim term “bonded with the outer surface of the colloidal silica abrasive particles” should be given its plain and ordinary meaning, *i.e.*, “bonded with the outer surface of the colloidal silica abrasive particles.”



## 12. “amine” (Claim 11)

Below is a chart showing the parties’ proposed claim constructions.

| <b>“amine”</b>                                                                                             |                                                                                                                                              |
|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CMC’s and Staff’s Construction</b>                                                                      | <b>Respondents’ Construction</b>                                                                                                             |
| “An organic compound derived by replacing one or more of the hydrogen atoms in ammonia by organic groups.” | “any of a class of basic organic compounds derived from ammonia by replacement of hydrogen with one or more monovalent hydrocarbon radicals” |

*See* Compl. Br. at 44; Resp. Br. at 36; Staff Br. at 55-57.

The specification discloses various suitable amines that can be used with the invention:

The aqueous liquid solution may further optionally include an alkali catalyst, for example, including an ether amine, an ethylene amine, a tetraalkyl amine, and/or an alcohol amine. Suitable alkali catalysts may include an organic base catalyst such as ethylenediamine, diethylenetriamine, triethylenetetramine, ammonia, urea, monoethanolamine, diethanolamine, triethanolamine, tetramethylammonium hydroxide (TMAH), tetramethylguanidine, tetraethylammonium hydroxide, aminopropylmorpholine, hexyloxypropylamine, ethyloxypropylamine (EOPA), jeffamine HK-511, or combinations thereof

JX-0001 (‘721 Patent) at 6:19–31.

As opined by Dr. Dauskardt, the claim construction proposed by CMC and the Staff is consistent with how the specification uses the term “amine,” the proposed construction is simply the chemical description of an amine, and it is consistent with how a POSA would have understood it. *See* CX-0006C (Dauskardt WS) at Q/A 77 (citing JX-0001 (‘721 Patent) at 6:19–31). Respondents argue, “Respondents’ construction is consistent with all the compounds in the ’721 patent identified as ‘amines,’ all of which

[REDACTED]

are (1) basic organic compounds, and thus positively charged under acidic conditions, derived from ammonia by (2) replacement of hydrogen with one or more monovalent hydrocarbon radicals.” Resp. Br. at 36. Yet, respondents’ construction is redundant as it uses the word “basic,” as a POSA have understood this from the structural description of replacing a hydrogen atom in ammonia with an organic group. *See CX-0229C* (Dauskardt RWS) at Q/A 102.

Accordingly, the administrative law judge has determined that the claim term “amine” should be construed to mean “an organic compound derived by replacing one or more of the hydrogen atoms in ammonia by organic groups.”

#### **B. Infringement Analysis of the ‘721 Patent**

As noted above, CMC asserts claims 1, 3–4, 6, 10–11, 13–14, 17–20, 24, 26–29, 31, 35–37, 39–44, and 46 of the ‘721 patent.

CMC argues, *inter alia*:

Respondents infringe the Asserted Claims, both directly and indirectly, by making, selling, using, and importing the Accused Products and components thereof. Respondents also sell and provide the Accused Products to their customers and other third parties for infringing use in the United States. Respondents have few rebuttal arguments. Respondents’ experts performed ***no testing*** of any Accused Product, and Respondents’ non-infringement positions largely rely on unsupported allegations of a “failure of proof.” But extensive technical documents and testimony from Respondents, as well as in-depth testing conducted at independent laboratories at the direction of CMC’s expert, establish clear proof of infringement by each of the Accused Products.

Compl. Br. at 44; *see id.* at 44-91.

Respondents argue that “CMC has failed to establish direct, induced, or contributory infringement, either literally or under the Doctrine of Equivalents.” Resp. Br. at 49; *see id.* at 49-80.

[REDACTED]

The Staff argues that “the Staff is of the view that CMC will demonstrate, by a preponderance of the evidence, that DuPont infringes the asserted claims.” Staff Br. at 70; *see id.* at 70-84.

For the reasons discussed below, the Accused Products directly infringe claims 1, 3–4, 10–11, 13–14, 18, 24, 26–29, 35–37. Moreover, each of the Accused Products, at “POU” (“point of use”), infringe claims 6, 17, 19–20, 31, and when used by respondents, their agents, or their customers, infringe claim 39–44 and 46.

### **1. Applicable Law**

Under 35 U.S.C. §271(a), direct infringement consists of making, using, offering to sell, or selling a patented invention without consent of the patent owner. The complainant in a section 337 investigation bears the burden of proving infringement of the asserted patent claims by a “preponderance of the evidence.” *Certain Flooring Products*, Inv. No. 337-TA-443, Comm’n Notice of Final Determination of No Violation of Section 337, 2002 WL 448690, at \*59, (Mar. 22, 2002); *Enercon GmbH v. Int’l Trade Comm’n*, 151 F.3d 1376 (Fed. Cir. 1998).

Literal infringement of a claim occurs when every limitation recited in the claim appears in the accused device, *i.e.*, when the properly construed claim reads on the accused device exactly.<sup>23</sup> *Amhil Enters., Ltd. v. Wawa, Inc.*, 81 F.3d 1554, 1562 (Fed. Cir. 1996); *Southwall Tech. v. Cardinal IG Co.*, 54 F.3d 1570, 1575 (Fed Cir. 1995).

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<sup>23</sup> Each patent claim element or limitation is considered material and essential. *London v. Carson Pirie Scott & Co.*, 946 F.2d 1534, 1538 (Fed. Cir. 1991). If an accused device lacks a limitation of an independent claim, the device cannot infringe a dependent claim. See *Wahpeton Canvas Co. v. Frontier, Inc.*, 870 F.2d 1546, 1552 n.9 (Fed. Cir. 1989).

If the accused product does not literally infringe the patent claim, infringement might be found under the doctrine of equivalents. “Under this doctrine, a product or process that does not literally infringe upon the express terms of a patent claim may nonetheless be found to infringe if there is ‘equivalence’ between the elements of the accused product or process and the claimed elements of the patented invention.” *Warner-Jenkinson Co., Inc. v. Hilton Davis Chemical Co.*, 520 U.S. 17, 21 (1997) (citing *Graver Tank & Mfg. Co. v. Linde Air Products Co.*, 339 U.S. 605, 609 (1950)). “The determination of equivalence should be applied as an objective inquiry on an element-by-element basis.”<sup>24</sup> *Id.* at 40.

“An element in the accused product is equivalent to a claim limitation if the differences between the two are insubstantial. The analysis focuses on whether the element in the accused device ‘performs substantially the same function in substantially the same way to obtain the same result’ as the claim limitation.” *AquaTex Indus. v. Techniche Solutions*, 419 F.3d 1374, 1382 (Fed. Cir. 2005) (quoting *Graver Tank*, 339 U.S. at 608); *accord Absolute Software*, 659 F.3d at 1139-40.<sup>25</sup>

Prosecution history estoppel can prevent a patentee from relying on the doctrine of equivalents when the patentee relinquished subject matter during the prosecution of the

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<sup>24</sup> “Infringement, whether literal or under the doctrine of equivalents, is a question of fact.” *Absolute Software, Inc. v. Stealth Signal, Inc.*, 659 F.3d 1121, 1130 (Fed. Cir. 2011).

<sup>25</sup> “The known interchangeability of substitutes for an element of a patent is one of the express objective factors noted by *Graver Tank* as bearing upon whether the accused device is substantially the same as the patented invention. Independent experimentation by the alleged infringer would not always reflect upon the objective question whether a person skilled in the art would have known of the interchangeability between two elements, but in many cases it would likely be probative of such knowledge.” *Warner-Jenkinson*, 520 U.S. at 36.

[REDACTED]

patent, either by amendment or argument. *AquaTex*, 419 F.3d at 1382. In particular, “[t]he doctrine of prosecution history estoppel limits the doctrine of equivalents when an applicant makes a narrowing amendment for purposes of patentability, or clearly and unmistakably surrenders subject matter by arguments made to an examiner.” *Id.* (quoting *Salazar v. Procter & Gamble Co.*, 414 F.3d 1342, 1344 (Fed. Cir. 2005)).

## **2. Accused Products**

The Accused Products include respondents’ Optiplane™ 2300 and Optiplane™ 2600 product families and components thereof. The Accused Product families can effectively be treated the same for purposes of the infringement issues in this investigation. *See* Compl. Br. at 45; Resps. Br. at 15 (“DuPont’s Optiplane™ 2300 and 2600 families of CMP slurries” are the “Accused Products,” as discussed throughout respondents’ brief, including infringement sections); CX-0006C (Dauskardt WS) at Q/A 308; RX-1402C (Raghavan RWS) at Q/A 145–48; CX-0007C (Auger Dep. Tr.) at 55 (“A. All of the ones that you mentioned just now. So, you know, the 2300, 2300A, 2600, 2601, and 2602, you know, from my perspective, [REDACTED] ; *see also* JX-0403C (Joint Stipulation).

Each Accused Product has different concentrations, including [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]. *See* CX-0006C (Dauskardt WS) at Q/A 411–15; JX-0175C (OPTIPLANE 2600 Acidic CMP Slurry) at 19; JX-0242C (Optiplane 2601) at 9. When respondents ship the products to customers at [REDACTED]

[REDACTED]  
[REDACTED], they also instruct customers to dilute the product to bring it to [REDACTED]. See CX-0006C (Dauskardt WS) at Q/A 198–211, 414–15, 508.

In their reply brief, respondents argue, “The Accused Products—Optiplane 2300™ and Optiplane™ 2600—contain different components and CMC, therefore, must address each separately.” Resp. Reply Br. at 16. Respondents argue that “CMC cites Dr. Miller’s testimony and his documentary evidence regarding [REDACTED] silica particles in Optiplane™ 2300 as support for showing infringement of all Accused Products,” even though “Optiplane™ 2600 [REDACTED]  
[REDACTED]” *Id.* at 17. Yet, the Joint Stipulation states, (1) “Any one of the Optiplane™ 2600, Optiplane™ 2601, Optiplane™ 2602, [REDACTED]  
[REDACTED], or *Optiplane™ 2300* ([REDACTED] slurries and silica particles thereof are representative of all models of the Optiplane™ 2600 product family and silica particles thereof;” and “Any one of the Optiplane™ 2300A or *Optiplane™ 2300* [REDACTED] slurries and silica particles thereof are representative of all models of the Optiplane™ 2300 product family and silica particles thereof.” JX-0403C (Joint Stipulation) at 1-2 (emphases added). In their reply brief, respondents, however, do not specify whether the the Optiplane™ 2300 they argue is different from Optiplane™ 2600, [REDACTED]  
[REDACTED]

In any event, detailed element-by-element infringement analyses below include discussions covering any relevant material differences between the two product families (Optiplane™ 2300 and Optiplane™ 2600).

### 3. Direct Infringement

As discussed above, CMC asserts claims 1, 3–4, 6, 10–11, 13–14, 17–20, 24, 26–

[REDACTED]

29, 31, 35–37, 39–44, and 46 of the ‘721 patent.

For the reasons discussed below, the Accused Products directly infringe claims 1, 3–4, 10–11, 13–14, 18, 24, 26–29, 35–37.

a. **Independent Claim 1**

i. **[1 pre] A chemical mechanical polishing composition comprising**

Respondents do not dispute that the preamble of claim 1 is met. *See* Resps. Br. at 59–61; RX-1402C (Raghavan RWS) at Q/A 150–78; JX-409C (Respondents’ Response to Request for Admission) at Nos. 35, 36. The Accused Products are chemical mechanical polishing compositions used for chemical mechanical planarization. *See, e.g.*, CX-0006C (Dauskardt WS) at Q/A 316–21. This is shown in respondents’ marketing material and safety data sheets for the Accused Products. JX-0010 (Dow Launches Optiplane); JX-0008 (respondents’ website); JX-0174C (Dow Advanced Acidic ILD Slurries - OPTIPLANE 2300); JX-0269C (Safety Data Sheet of Optiplane 2300A); JX-0270C (Safety Data Sheet: OPTIPLANE 2602 Slurry).<sup>26</sup>

ii. **[1a] a water based liquid carrier;**

Respondents do not dispute that this limitation is met. *See* Resps. Br. at 59–61; RX-1402C (Raghavan RWS) at Q/A 150–78; JX-0409C (Respondents’ Response to

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<sup>26</sup> Even if the Staff’s proposed claim construction were adopted, the Accused Products would meet all the various limitations imported into the claims through that construction. For example, and even though a full record was never developed and never needed to be developed during discovery on these points, the Accused Products all include [REDACTED] [REDACTED], CX-0006C (Dauskardt WS) at Q/A 165, are commercial products, *id.* at Q/A 317–18, and can be used on multiple different substrates. *See* JX-0185C (Optiplane 2300/2600 & [REDACTED]) at 22 (showing test results of Optiplane 2300 [REDACTED]).

[REDACTED]

Request for Admission) at Nos. 37–39, 40–41. The Accused Products include a water based liquid carrier. *See, e.g.*, CX-0006C (Dauskardt WS) at Q/A 322–27. This is shown in respondents' recipes and technical documents (*see* JX-0207C ([REDACTED] OPTIPLANE 2300 - Advanced Acidic ILD Slurry); JX-0207C ([REDACTED] OPTIPLANE 2300 - Advanced Acidic ILD Slurry); JX-0227C (OP2300 & OP2600 Formulations); JX-0242C (OPTIPLANE 2601 Acidic ILD Slurry Slot into Development gate Presentation); JX-0198C (Rohm & Haas Recipe Select - OP2602 Full); JX-0199C (Rohm & Haas Recipe Select - OP2602 Full); JX-0391C (Rohm & Haas Recipe Select - OP2602 Full)) as well as their safety data sheets (JX-0269C (Safety Data Sheet of Optiplane 2300A Slurry); JX-0270C (Safety Data Sheet of OPTIPLANE 2602 Slurry)).

**iii. [1b] colloidal silica abrasive particles dispersed in the liquid carrier;**

Respondents' experts do not dispute that this limitation is met by the Accused Products under any party's proposed constructions. *See* Resps. Br. at 59–61; RX-1402C (Raghavan RWS) at Q/A 150–78; Resps. Reply Br. at 13–18. Specifically, both the Optiplane 2300 and Optiplane 2600 families include [REDACTED] particles, which are colloidal silica abrasive particles under all parties' proposed constructions. Tr. 293 (Mr. Jacobs testifying: “Q. Now, let's talk about DuPont's importation of colloidal silica particles into the United States. Optiplane 2300 and 2600 products contain [REDACTED] particles as part of their mixture, right? A. That is correct.”); CX-0006C (Dauskardt WS) at Q/A 336. This claim limitation is met by the colloidal silica abrasive particles in the Optiplane 2300 family products—[REDACTED]  
[REDACTED]. For the same reasons,

[REDACTED]  
this limitation is met by the Optiplane 2600 family products, [REDACTED]

[REDACTED].  
*Id.*; CDX-0006C.0063 (JX-0207C [REDACTED] OPTIPLANE) at 2).

For example, respondents' documents describe the Accused Products as including colloidal silica abrasive particles dispersed in a liquid carrier, and [REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED]  
See CX-0006C (Dauskardt WS) at Q/A 328–38; JX-0185C (Dow Advanced ILD Slurries - OPTIPLANE 2300/2600) at 11; JX-0173C (Developmental Gate Presentation: OPTIPLANE 2602) at 5; JX-0188C (DuPont Advanced Acidic ILD Slurries Optiplane 2300 and 2600 CMP Slurries) (describing “[REDACTED]

[REDACTED] JX-0207C [REDACTED]  
OPTIPLANE 2300 - Advanced Acidic ILD Slurry); JX-0234C (Spreadsheet); JX-0227C (Excel - OP2300 & OP2600 Formulations); JX-0185C (Dow Advanced ILD Slurries - OPTIPLANE 2300/2600), JX-0187C (OPTIPLANE 2300/2600 Series [REDACTED]

[REDACTED] JX-0175C (OPTIPLANE 2600 Acidic CMP Slurry); JX-0409C  
(Respondents' Response to Request for Admission) at Nos. 45–46, 68–73.

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<sup>27</sup> Although respondents argue that the term “colloidal silica abrasive particles” should be construed as a product-by-process term, none of respondents’ experts advanced a non-infringement theory based on that construction. As discussed in the context of claim construction, the term “colloidal silica abrasive particle” under any party’s proposed construction is directed to a structurally distinct silica abrasive particle, not a product-by-process limitation. Even if respondents were correct that “colloidal silica abrasive particle” should be construed as a product-by-process limitation, it is satisfied because [REDACTED]

[REDACTED]. See CX-0006C (Dauskardt WS) at Q/A 329–30, 337; CX-0010C (Guo Dep. Tr.) at 17; CX-0012C (Jacobs Dep. Tr.) at 76–77.

[REDACTED]

iv. [1c] a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof, wherein the chemical species is a nitrogen containing compound or a phosphorus containing compound;

Respondents do not dispute this limitation is met under any party's proposed constructions. *See* Resp. Br. at 59–61; RX-1402C (Raghavan RWS) at Q/A 151–55; CX-0006C (Dauskardt WS) at Q/A 339–352. Specifically, for both the Optiplane 2300 and Optiplane 2600 families, there is [REDACTED]

[REDACTED] of the colloidal silica abrasive particles. Testing directed and overseen by Dr. Dauskardt confirmed that [REDACTED] to the population of colloidal silica abrasive particles, at [REDACTED] in the Optiplane 2300 products, and [REDACTED] in the Optiplane 2600 products. *See* CX-0006C (Dauskardt WS) at Q/A 340–43.

The source of the [REDACTED], and the [REDACTED] [REDACTED] and when the entire population of abrasive particles is considered because [REDACTED] [REDACTED] the silica particles in the population by weight. *Id.* at Q/A 334–36, 343–48; *see also* JX-0213C (Development of Next-Gen Low Abrasive ILD Slurry, OPTIPLANE 2300, Leveraging CMP Mechanism and Particle Modification Studies) (indicating that [REDACTED] [REDACTED] " and DuPont uses [REDACTED] [REDACTED] in the Accused Products); JX-0217C (OP2300 NMR Analysis) (NMR Analysis

showing [REDACTED] JX-0231C (Update on New [REDACTED] Particle) at 9, 10 (showing certain amount of [REDACTED] JX-0176C (CMP Slurry Update) at 12 (listing certain amount of [REDACTED] JX-0247C (Measurement Data) (listing an amount of [REDACTED] JX-0167C (Low Selective Acidic ILD Slurry Slot into Assessment Gate Presentation) at 9 (identifying [REDACTED]

[REDACTED]<sup>28</sup>

Respondents' experts do not dispute that the colloidal silica abrasive particles in the Accused Products [REDACTED]. *See* Tr. 464 (Dr. Klein testifying: "Q. Now, you understand that the accused products include particles called [REDACTED] particles, right? A. Yes. Q. You understand that [REDACTED] *see also* CX-0010C (Guo Dep. Tr.) at 176 (testifying [REDACTED])"); *id.* at 178–179; *see also* CX-0007C (Auger Dep. Tr.) at 199; CX-0014C (Mosley Dep. Tr.) at 184–185, 228. Indeed, the Accused Products are designed to rely on [REDACTED]  
[REDACTED]  
[REDACTED]" *See* CX-0006C (Dauskardt WS) at Q/A 344; JX-0213C (Development of Next-Gen Low Abrasive ILD Slurry, OPTIPLANE 2300, Leveraging CMP Mechanism and Particle Modification Studies).

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<sup>28</sup> As discussed above in the Claim Construction section, respondents construe this term to mean "the colloidal silica abrasive particles contain within, including at or near, their external surfaces one or more chemical species." While respondents' construction is incorrect, [REDACTED] is contained within, including at or near, the external surfaces of the particles. *See* CX-0006C (Dauskardt WS) at Q/A 350.

[REDACTED]

v. [1d] a pH in a range from about 3.5 to about 6

Respondents do not dispute that this limitation is met by the Accused Products.

*See* Resps. Br. at 59–61; RX-1402C (Raghavan RWS) at Q/A 150–78. The pH of the Accused Products [REDACTED] was shown via Dr. Dauskardt’s testing. CX-0024C (DTI Analysis Report) at 11 (measuring a pH [REDACTED] for Accused Products [REDACTED] CX-0026C (PTL Analysis report II) at 3–5 (measuring a pH [REDACTED] for Accused Products a [REDACTED] [REDACTED]; CX-0006C (Dauskardt WS) at Q/A 361. This testing is consistent with respondents’ technical documents. *See, e.g.*, CX-0006C (Dauskardt WS) at Q/A 353–61; JX-0266C (Safety Data Sheet of Optiplane 2300 Slurry) (indicating a pH range of 3.5–5.0); JX-0173C (Developmental Gate Presentation: OPTIPLANE 2602)(indicating a pH of [REDACTED] for Optiplane 2300A and a pH of [REDACTED] for Optiplane 2602); JX-0242C (OPTIPLANE 2601 Acidic ILD Slurry Slot into Development gate Presentation); JX-0267C (Certificate of Analysis for Optiplane 2300A); JX-0191C (Dynamic Pot-Life and Handling Evaluation of Optiplane 2300 Slurry) (showing a dynamic study pH of Optiplane 2300 at [REDACTED]

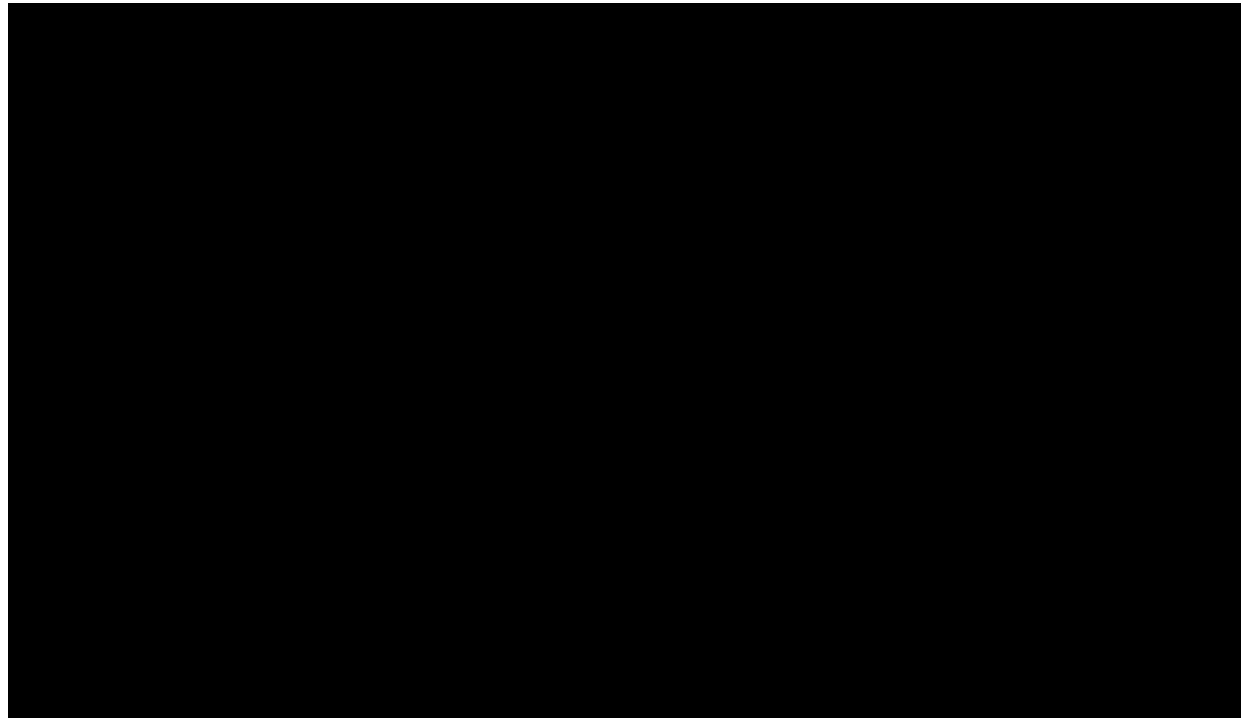
vi. [1e] wherein the colloidal silica abrasive particles have a permanent positive charge of at least 15 mV; and

Under any proposed construction, the Accused Products meet this limitation. *See* CX-0006C (Dauskardt WS) at Q/A 362–81. Infringement is clear from the extensive testing Dr. Dauskardt directed and oversaw at two independent commercial labs, using two different zeta potential measurement instruments—the DT-1202 instrument, which is

[REDACTED]

specified in the '721 patent, and the Malvern Zetasizer instrument, which respondents argue is a more common instrument. *See CX-0006C* (Dauskardt WS) at Q/A 257–304; RX-1401C (Miller RWS) at Q/A 131. The Accused Products were measured in accordance with testing procedure in the '721 patent. Zeta potential was measured prior to conducting the three-step filtration test, and permanent positive charge was determined after the three-step filtration test.

For all products, the resulting permanent positive charge of the colloidal silica abrasive particles was [REDACTED] *See CX-0006C* (Dauskardt WS) at Q/A 364–65. These infringing permanent positive charge values measured by both instruments, the DT-1202 and the Malvern Zetasizer, were highly consistent. CX-0229C (Dauskardt RWS) at Q/A 843. The test results of the Accused Products [REDACTED] are summarized in CDX-0006C.0031, depicted below. *See CDX-0006C.0031* (CX-0026C (PTL Analysis Report II) at 3–5; CX-0024C (DTI Analysis Report) at 11). As Dr. Dauskardt explains, the filtration test he used also shows that [REDACTED] [REDACTED] that is not readily reversible, for example, via flushing, dilution, filtration, and the like,” under respondents’ construction of “permanent positive charge.” CX-0006C (Dauskardt WS) at Q/A 371.



As shown, the population of colloidal silica particles in the Optiplane 2300A products [REDACTED] have a permanent positive charge of [REDACTED] [REDACTED] as measured by the DT-1202, and a permanent positive charge of [REDACTED] [REDACTED] as measured by the Malvern instrument. *See CX-0006C (Dauskardt WS) at Q/A 365.* The population of colloidal silica abrasive particles in the Optiplane 2602 products [REDACTED] have a permanent positive charge of [REDACTED] as measured by the DT-1202, and about [REDACTED] as measured by the Malvern instrument.

*Id.* The population of colloidal silica abrasive particles in the Optiplane 2601 products [REDACTED] have a permanent positive charge of [REDACTED], as measured by the DT-1202, and [REDACTED] as measured by the Malvern instrument. *Id.*

Ultimately, the permanent positive charge values of all Accused Products fall well within the claimed range.

[REDACTED]

Despite these results and despite not doing any testing of their own, respondents allege a “failure of proof.” First, respondents’ experts, applying respondents’ proposed claim construction, opine that CMC should have [REDACTED]  
[REDACTED]  
[REDACTED]. *See* Resp. Br. at 50-52. As discussed above in the Claim Construction section, such an approach is not consistent with the ‘721 patent. Nonetheless, there is no “failure of proof” under this theory. The technical documentation and Dr. Dauskardt’s testing clearly shows the permanent positive charge of [REDACTED] particles [REDACTED] also falls well within the claim scope. *See* CX-0006C (Dauskardt WS) at Q/A 372–81.

For example, respondents’ own documents show that [REDACTED] particles, serving the role of “[REDACTED]  
[REDACTED]  
[REDACTED]. *Id.* at Q/A 372–76; Tr. 185 (Dr. Dauskardt testifying that rule of [REDACTED] “is such fundamentally well-known principle.”), Tr. 187 (Dr. Dauskardt explaining that “CVI, which is the colloidal vibration current that is measured, is related to the volume fraction,” consistent with “the fundamental physics of a rule of [REDACTED], Tr. 395 (Dr. Miller admitting that it is “a reasonable rule of thumb” that the particles with the higher charge would have a higher true zeta potential”), Tr. 398–402 (Dr. Miller admitting that the document he cited shows [REDACTED] have a lower zeta potential than the Accused Products). This analysis is consistent with the ‘721 patent, which shows in Example 12 that a single zeta potential measurement for two types of

[REDACTED]

particles will be the weighted average of those particles.<sup>29</sup> *See JX-0001 ('721 Patent) at 29:40–30:55; CX-0006C (Dauskardt WS) at Q/A 373; Tr. 233-234.*

In addition, Dr. Dauskardt's testing shows that [REDACTED] of permanent positive charge of the entire population is higher than 15 mV; the [REDACTED] necessarily also have a permanent positive charge of above 15 mV. *See CX-0006C (Dauskardt WS) at Q/A 377–81; Tr. 223-226.*

[REDACTED]

CDX-0006C.0052 (CX-0026C (PTL Analysis Report II) at 20). Ultimately, the test data conclusively shows that, even considering the permanent positive charge that results [REDACTED]

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<sup>29</sup> Contrary to respondents' argument (Resps. Br. at 52, 54), the particles in Example 12 have different morphologies, [REDACTED]. *See JX-0001 ('721 Patent) at 29:51–55 (“Each composition included a blend of a first colloidal silica (having a mean particle size of about 60 nm in which greater than 50% of the aggregates included three or more primary particles) and a second colloidal silica (25 nm primary particles.”); Tr. 234.*

[REDACTED]  
[REDACTED] particles as respondents would require, this claim limitation is met by the Accused Products.

Indeed, neither Dr. Raghavan nor Dr. Klein challenge Dr. Dauskardt's analysis of the permanent positive charge distribution. Respondents' third expert Dr. Miller does not contradict Dr. Dauskardt's opinion when Dr. Miller opines that "diffusion broadening always accompanies that distribution." *See RX-1401C* (Miller RWS) at Q/A 210. Dr. Miller's statement in fact confirms that Dr. Dauskardt's conclusion of the permanent positive charge of [REDACTED] is "conservative" because of the "broadening of the distribution," and "the actual zeta potential distribution would have been narrower." *See CX-0006C* (Dauskardt WS) at Q/A 379. In other words, an even higher percentage of particles would be shown as measuring above 15 mV were it not for this diffusion broadening.<sup>30</sup>

Second, respondents argue that CMC improperly used an "eight-step" filtration test to measure the permanent positive charge of the Accused Products. That is not factually correct with regard to the majority of the tested samples. *See* Resp. Br. at 54-56. As is clear in his test results, Dr. Dauskardt oversaw permanent positive charge testing of all of the Accused Products at a POU concentration [REDACTED] for Optiplane 2300A, 2602, and 2601) with three steps. *See CX-0006C* (Dauskardt WS) at Q/A 275-

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<sup>30</sup> The documents pointed to by respondents to try to rebut the clear test results (Resp. Br. at 53) are either irrelevant or further prove that the permanent positive charge of [REDACTED] particles by themselves is higher than that of the Accused Products measured by Dr. Dauskardt. *See* Tr. 397-398 (Dr. Miller admitting that RX-1425C describes different particles than those in the Accused Products), 398-402 (Dr. Miller admitting that RX-1426C shows [REDACTED] silica particles [REDACTED] have a lower zeta potential than the Accused Products).

[REDACTED]

76 (also using the three step filtration to test Optiplane 2601 at the as-received concentration of [REDACTED]. This testing alone proves infringement because it measures permanent positive charge of the products as respondents test them, as provided to respondents' customers and as their customers use them. *See CX-0006C (Dauskardt WS)* at Q/A 193–211, 414–15, 508.

Respondents focus on different, additional testing that CMC performed of Accused Products in a highly concentrated form ([REDACTED]). This testing further bolsters infringement by showing across-the-board permanent positive charge in the claimed ranges [REDACTED]. Due to efficiency and timing considerations in filtering these [REDACTED] samples, Dr. Dauskardt did the filtering steps in more times with the same total amount of pH adjusted DI water. *See CX-0006C (Dauskardt WS)* at Q/A 277; Tr. 193. The process led to the same measurement—identifying the permanent positive charge by removing weakly adsorbed species on the particles—but in a shorter time period.<sup>31</sup> *See CX-0006C (Dauskardt WS)* at Q/A 370. Dr. Miller, who never did any testing of the Accused Products, has no basis to allege that the additional steps “fail[] to remove interferences.” *See* Resps. Br. at 55–56 (citing RX-1401C (Miller RWS).)

Respondents also have no basis to allege any deviation in pH or conductivity adjustment. *See CX-0006C (Dauskardt WS)* at Q/A 259; JX-0001 ('721 Patent) at

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<sup>31</sup> Nonetheless, to the extent respondents argue that the permanent positive charge results for the [REDACTED] samples do not literally meet the claim, they infringe under doctrine of equivalents. Even to the extent a minor modification of the three-step filtration test was applied, *CX-0006C (Dauskardt WS)* at Q/A 365, the modified procedures were conducted in substantially the same way as described in the '721 patent, and performed the same function of removing weakly adsorbed species on the particles, in the same way (repeated filtration), and achieved the same results. *Id.* at Q/A 370.

[REDACTED]

11:56–61 (describing the need for matching pH and conductivity). Respondents essentially argue that they would have used a different test for permanent positive charge other than the one expressly and thoroughly described by the inventors. *See* Resps. Br. at 54–56.

Third, respondents argue that DT-1202 and Malvern instruments are not “quantitative[ly] reliable” based on the testimony of Dr. Miller, who has no experience with CMP slurries, is unfamiliar with DT-1202 instrument, and conducted no testing of the Accused Products. *See, e.g.*, Resps. Br. at 56–57; RX-1401C (Miller RWS) at Q/A 154; Tr. 370–371 (Dr. Miller admitting that he “never had any prior experience at all with CMP”), 377 (Dr. Miller admitting that he “never used a DT-1202 instrument”), 375 (Dr. Miller admitting that he “performed no testing”).

This position is not supported by respondents’ other technical experts, who do not challenge Dr. Dauskardt’s testing results. *See, e.g.*, RX-1402C (Raghavan RWS) at Q/A 160 (arguing only that the Accused Products do not meet this limitation under respondents’ construction); Tr. 462 (admitting that she has “no reason to doubt [Dr. Dauskardt’s] measurements of zeta potential”). The position is also directly contradicted by respondents’ own measurements of zeta potential values in the ordinary course of business. *See* CX-0006C (Dauskardt WS) at Q/A 367–69, 261, 274–78, 294–96, 303; JX-0191C (Optiplane 2300 slurry document) at 11 (showing the zeta potential of Optiplane 2300 products at [REDACTED]); JX-0188C (DuPont Slurry Document) at 3 (illustrating the zeta potential of Optiplane 2300 and 2600 products at [REDACTED]).

Indeed, the Malvern and DT-1202 are highly accurate and reliable instruments used extensively in the CMP industry—including by respondents—for measuring zeta

[REDACTED]

potential of these exact particles. *See CX-0229C (Dauskardt RWS)* at Q/A 837–39, 843.

Moreover, the instruments produced highly consistent results when measuring the Accused Products. *See CX-0229C (Dauskardt RWS)* at Q/A 812–52. Respondents' allegations of "loss of particles" in filtering and lack of "calibrat[ion]" reflect speculation based on unrelated data, and are unpersuasive in view of respondents' failure to do any testing at all and Dr. Miller's unfamiliarity with CMP slurries. *See* Resps. Br. at 56-57; CX-0006C (Dauskardt WS) at Q/A 274, 278; Tr. 675.

Finally, to the extent this limitation is not literally met under respondents' claim construction, which respondents argue requires all of the measured permanent positive charge to result from the [REDACTED] particles, this limitation is also met under the doctrine of equivalents. Even if the entirety of the measured permanent positive charge is not attributable to [REDACTED] particles, the permanent positive charge of the colloidal silica abrasive particles in the Accused Products performs the same function as in the '721 patent (providing colloidal silica abrasive particles having a permanent positive charge), in the same way (by including internal nitrogen species in those particles), to achieve the same result (improving performance and removal rate). *See CX-0006C (Dauskardt WS)* at Q/A 381. The differences are insubstantial, particularly given that [REDACTED]

[REDACTED].

*Id.*

Contrary to respondents' argument (Resps. Br. at 60-61), a structure in which both [REDACTED] contribute to permanent positive charge is what the inventors contemplated. The patent shows that a "low level" of internal nitrogen coupled with external aminosilane achieves the benefits of "moving

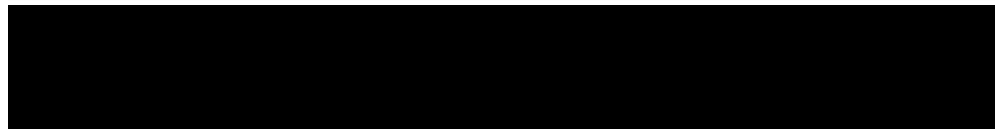
some of the charge to the interior” and “having more of the surface available for the chemical-mechanical planarization”). *See* Tr. 238; JX-0001 at 7:59–61 (“low level of the internal chemical species”), 32:40–42 (working example with “low level” of EOPA and aminosilane, [REDACTED]).

vii. **[1f] wherein the chemical species is not an aminosilane or a phosphonium silane.**

This limitation is met by the Accused Products under any party’s proposed construction. *See* CX-0006C (Dauskardt WS) at Q/A 382–85. As discussed above, in the Accused Products, the chemical species is [REDACTED], which is not an aminosilane or a phosphonium silane. *See* CX-0006C (Dauskardt WS) at Q/A 382–85; JX-0409C (Respondents’ Response to Request for Admission) at Nos. 66, 67.

[REDACTED]  
[REDACTED] of the colloidal silica abrasive particles in the Accused Products, the particles do not contain aminosilane or phosphonium silane compounds. *See* CX-0006C (Dauskardt WS) at Q/A 382–85; JX-0213C (Development of Next-Gen Low Abrasive ILD Slurry, OPTIPLANE-2300, Leveraging CMP Mechanism and Particle Modification Studies) (indicating [REDACTED]); CX-0010C (Guo Dep. Tr.) at 73-74 (explaining that [REDACTED]), 230-231 (explaining that [REDACTED]); Tr. 295-296 (Mr. Jacobs testifying: “Q. Now, you testified that [REDACTED]  
[REDACTED] A. Correct.”).

For all of the above reasons, all of the Accused Products practice claim 1.



**b. Dependent Claims**

**i. Claim 3: The composition of claim 1, further comprising a buffering agent having a pKa in a range from about 3.5 to about 5.5.**

Record evidence, including testing, shows that each Accused Product includes a buffering agent, [REDACTED] which has a pKa from about 3.5 to 5.5. *See, e.g.* CX-0006C (Dauskardt WS) at Q/A 386–94; JX-0118C (PubChem, [REDACTED]) at 8 (showing that [REDACTED] has a pKa of [REDACTED]); JX-0207C ([REDACTED] OPTIPLANE) at 11382; JX-0227C (OP2300 & OP2600 Formulations) (listing [REDACTED] [REDACTED] component of Optiplane 2300); JX-0173C (Developmental Gate Presentation: OPTIPLANE 2602) at 3875 (indicating that the [REDACTED] in Optiplane 2300 also serves as [REDACTED]); JX-0204C (2019 DuPont document) at 7974 (“[REDACTED] [REDACTED]”); JX-0205C ([REDACTED]) at 8297 [REDACTED]”). Dr. Raghavan’s opinion that [REDACTED] does not function as a buffer (RX-1402C (Raghavan RWS) at Q/A 181), is refuted by respondents’ own description of its buffer capacity. *See* Resps. Br. at 61–62; JX-0409C (Respondents’ Response to Request for Admission) at 106, 107, 111, 112, 116, 117 (admitting [REDACTED] [REDACTED]”); JX-0249C (Benchmark analysis) at 01 Slurry Properties tab (comparing [REDACTED] between OP2300, OP2600, and competitor’s slurry); CX-0006C (Dauskardt WS) at Q/A 390. Accordingly, all Accused Products infringe claim 3.

**ii. Claim 4: The composition of claim 1, wherein the colloidal silica abrasive particles have a mean particle size in a range from about 30 to about 70 nm.**

[REDACTED]

Respondents' specifications for mean particle size and measured mean particle size values for the Accused Products show that claim 4 is met. *See, e.g.* CX-0006C (Dauskardt WS) at Q/A 395–406; JX-0185C (ILD Slurries) at 11 (listing mean particle size of [REDACTED] for Optiplane 2300); JX-0175C (OPTIPLANE 2600 Acidic CMP Slurry) at 5 (depicting CPS particle size distribution of Optiplane 2300 and 2600 of [REDACTED]  
[REDACTED]); JX-0187C (OPTIPLANE 2300/2600 Series [REDACTED]  
[REDACTED]) at 4 (listing mean particle size of [REDACTED] for Optiplane 2300); JX-0225C (D9228 Benchmark Analysis) (showing that, as measured by DLS, the mean particle size for OP2300 is [REDACTED] and for OP2600 is [REDACTED]). Dr. Dauskardt also determined the mean particle size of [REDACTED] particles [REDACTED] falls within the claimed range. *See* CX-0006C (Dauskardt WS) at Q/A 402–04; JX-0201C (Certificate of Analysis) (reporting the secondary particle size of [REDACTED] particles of [REDACTED]); JX-0202C (Certificate of Analysis) (same); JX-0203C (Certificate of Analysis) (reporting secondary particle size of [REDACTED] particles of [REDACTED]).

Dr. Raghavan opines that Dr. Dauskardt ignored the primary particle size. See Resp. Br. at 62. As explained by Dr. Dauskardt, primary particle size “corresponds to a sub-portion of an aggregated particle, not a mean particle size.” *See* CX-0006C (Dauskardt WS) at Q/A 405; RX-1402C (Raghavan RWS) at Q/A 195. Accordingly, all Accused Products infringe claim 4.

iii. **Claim 6: The composition of claim 1, comprising from about 0.5 to about 4 weight percent of the colloidal silica abrasive particles.**

[REDACTED]

The Accused Products are designed to be and are provided to customers and used by respondents and their customers at [REDACTED] of colloidal silica abrasive particles or less, squarely within the claim. *See CX-0006C (Dauskardt WS) at Q/A 407–12; JX-0189C (Optiplane 2300 / 2600 Series [REDACTED]); JX-0191C (Dynamic Pot- Life and Handling Evaluation of Optiplane 2300 Slurry) at 6356 (showing test results of [REDACTED] Optiplane 2300); JX-0187C (OPTIPLANE 2300/2600 Series [REDACTED]) (listing Abrasive [REDACTED] for Optiplane 2300 [REDACTED] [REDACTED] JX-0188C (Optiplane document) (listing Abrasive [REDACTED] for Optiplane 2300 at [REDACTED] JX-0258C ([REDACTED] Document) at 20618 (showing [REDACTED] [REDACTED] abrasive of OP2300). Respondents also make Optiplane 2601 at [REDACTED] [REDACTED] colloidal silica abrasive particles. See CX-0006C (Dauskardt WS) at Q/A 413–15.*

Respondents argue that dilution impacts slurry “properties.” *See* Resps. Br. at 62–63. This is not relevant to whether claim 6 is met, and is not relevant to any other claim, because, as discussed above, CMC tested and showed the properties of the Accused Products at both [REDACTED] and at [REDACTED] for OP2601 and [REDACTED] [REDACTED] for other products). *See CX-0006C (Dauskardt WS) at Q/A 316–85.* Therefore, all Accused Products [REDACTED] infringe claim 6, and Optiplane 2601 also infringes claim 6 as made at [REDACTED] concentration.

**iv. Claim 10: The composition of claim 1, wherein the chemical species is not ammonium.**

The chemical species identified in the colloidal silica abrasive particles in each Accused Product is [REDACTED] which is not ammonium. *See CX-*

[REDACTED]

0006C (Dauskardt WS) at Q/A 417–19; JX-0409C (Respondents’ Response to Request for Admission) at 135. Respondents argue that CMC has not proven an absence of ammonium in the particles and point to [REDACTED] as a potential source of ammonium. *See* Resp. Br. at 63. [REDACTED] do not contain ammonium (as discussed in the context of invalidity), and respondents cite no testing, documents or other evidence. Accordingly, all the Accused Products infringe claim 10.

v. **Claim 11: The composition of claim 1, wherein the chemical species comprises a primary amine, a secondary amine, a tertiary amine, or a quaternary amine compound.**

Respondents do not dispute that this limitation is met. As discussed, the chemical species identified in the Accused Products is [REDACTED], which is a [REDACTED] amine. *See* Resp. Br. at 63; CX-0006C (Dauskardt WS) at Q/A 420–21; JX-0409C (Respondents’ Response to Request for Admission) at No. 136. Accordingly, all Accused Products infringe claim 11.

vi. **Claim 13: The composition of claim 1, wherein the chemical species comprises from 1 to 6 carbon atoms.**

Respondents do not dispute that this limitation is met. As discussed, the identified chemical species is [REDACTED] which comprises [REDACTED] carbon atoms. *See* Resp. Br. at 63; CX-0006C (Dauskardt WS) at Q/A 422–423; JX-0409C (Respondents’ Response to Request for Admission) at No. 137. Accordingly, all Accused Products infringe claim 13.

vii. **Claim 14: The composition of claim 13, wherein the chemical species comprises**

[REDACTED]

**ethyloxypropylamine, tetramethyl  
ammonium hydroxide, or  
ethylenediamine.**

Respondents do not dispute that this limitation is met. As discussed, the chemical species is [REDACTED], which is also known as [REDACTED]. *See* Resps. Br. at 63; CX-0006C (Dauskardt WS) at Q/A 424–25. Accordingly, all Accused Products infringe claim 14.

viii. **Claim 17: The composition of claim 1,  
having an electrical conductivity of less  
than about 300  $\mu\text{S}/\text{cm}$ .**

Testing conducted by Dr. Dauskardt and numerous documents produced by respondents show that the Accused Products at [REDACTED] have an electrical conductivity less than about 300  $\mu\text{S}/\text{cm}$ . *See, e.g.*, CX-0006C (Dauskardt WS) at Q/A 427–31; JX-0189C (Optiplane 2300 / 2600 Series [REDACTED]) at 10; JX-0187C (listing Optiplane 2300 [REDACTED]” conductivity as [REDACTED] [REDACTED] at 4; JX-0188C (DuPont Advanced Acidic ILD Slurries Optiplane 2300 and 2600 CMP Slurries, May 2019) at 5 (same); JX-0258C (Troubleshooting Issues of OPTIPLANE 2300 Slurry) at 2 (showing conductivity testing data of [REDACTED] Optiplane 2300); JX-0409C (Respondents’ Response to Request for Admission) at Nos. 164–67 ([REDACTED]); CX-0024C (DTI Analysis Report) at 11; CX-0026C (PTL Analysis Report II) at 3–5.

Respondents argue that claim 17 is limited to high concentration slurries. *See* Resps. Br. at 63–64 (arguing [REDACTED] slurries at [REDACTED] are somehow an “unclaimed, diluted form”). The inventors measured conductivity of slurries at 2 wt%, [REDACTED] [REDACTED]. *See* JX-0001 at 24:15–60 (measuring conductivity in Table 6B of

[REDACTED]

compositions at 2 wt% in Table 6A). Accordingly, all Accused Products infringe claim 17.

ix. **Claim 18: The composition of claim 1, wherein the colloidal silica has a density of greater than 1.90 g/cm3.**

Respondents do not dispute that this limitation is met. *See* Resps. Br. at 63. Dr. Dauskardt's testing shows the true density—the appropriate measure, CX-0006C (Dauskardt WS) at Q/A 434—of colloidal silica abrasive particles in the Accused Products is [REDACTED] for the Optiplane 2300A products and [REDACTED] for Optiplane 2602 products, both within the claimed range. CX-0025C (PTL Analysis Report I) at 6; CX-0006C (Dauskardt WS) at Q/A 432–36.

x. **Claim 19: The composition of claim 1, wherein the colloidal silica abrasive particles have a permanent positive charge of at least 15 mV; the composition has a pH in a range from about 3.5 to about 6; the colloidal silica abrasive particles have a mean particle size in a range from about 30 to about 70 nm; and the composition includes from about 0.5 to about 4 weight percent of the colloidal silica abrasive particles.**

Respondents do not dispute that this limitation is met. *See* Resps. Br. at 64. For the reasons discussed above with respect to claims 1, 4, and 6, all of the Accused Products [REDACTED] infringe claim 19. *See* CX-0006C (Dauskardt WS) at Q/A 437–42.

xi. **Claim 20: The composition of claim 1, wherein the colloidal silica abrasive particles have a permanent positive charge of at least 15 mV; the composition further includes a buffering agent having a pKa in a range from about 3.5 to about**

[REDACTED]

**5.5; the composition includes from about 0.5 to about 4 weight percent of the colloidal silica abrasive particles; the colloidal silica has a density of greater than 1.90 g/cm<sup>3</sup>; and the chemical species comprises from 1 to 6 carbon atoms.**

Respondents do not dispute that this limitation is met. *See* Resps. Br. at 64. For the reasons discussed above with respect to claims 1, 3, 6, 13, and 18, all Accused Products [REDACTED] also infringe claim 20. *See* CX-0006C (Dauskardt WS) at Q/A 443–49.

xii. **Claim 24: The composition of claim 1, further comprising a silicon nitrogen polishing accelerator including a polycarboxylic acid, a poly phosphonic acid, or a mixture thereof.**

The Accused Products include a [REDACTED]. *See, e.g.*, CX-0006C (Dauskardt WS) at Q/A 450-53; JX-0227C (OP2300 & OP2600 Formulations) (listing [REDACTED] as a component of Optiplane 2300 and Optiplane 2600 products); JX-0221C (OP2600 Formulation); JX-0263C (OP2300 Technical Team Meeting) at 11. Moreover, the ‘721 patent expressly discloses [REDACTED] as a silicon nitrogen polishing accelerator. JX-0001 (‘721 Patent) at 12:56–64. Respondents provide no support for their arguments that [REDACTED] is not present in a large enough amount to be a polishing accelerator beyond conclusory statements. *See* Resps. Br. at 64. Accordingly, all Accused Products infringe claim 24.

c. **Independent Claim 26**

**Claim 26: A chemical mechanical polishing composition comprising: a water based liquid carrier; colloidal silica abrasive particles dispersed in the liquid carrier; a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof, wherein the chemical species is a nitrogen containing compound or a phosphorus containing compound; a pH in a range from about 1.5 to about 7;**

[REDACTED]

**wherein the colloidal silica abrasive particles have a permanent positive charge of at least 13 mV; and wherein an aminosilane compound is bonded with the outer surface of the colloidal silica abrasive particles.**

For the reasons discussed above with respect to claim 1, the Accused Products meet each limitation [1pre], [a], [b], [c], [d], and [e] in claim 26. *See CX-0006C* (Dauskardt WS) at Q/A 454–61. There is no dispute the additional “bonded” limitation is also met under any party’s proposed construction. *See* Tr. 235-238; CX-0006C (Dauskardt WS) at Q/A 462–69; RX-1402C (Raghavan RWS) at Q/A 242–45 (conceding [REDACTED]). Respondents’ documents and witnesses describe [REDACTED] the colloidal silica abrasive particles in the Accused Products, which [REDACTED]. *See* JX-0213C (Development of Next- Gen Low Abrasive ILD Slurry); JX-0181C (Development of Advanced Low-Abrasive Dielectric CMP slurry) at 10; JX-0178C (Technical Review - Development of Advanced Acidic ILD Slurry); JX-0207C ([REDACTED] OPTIPLANE 2300 - Advanced Acidic ILD Slurry); Tr. 295-296; CX-0010C (Guo Dep. Tr.) at 78, 179; CX-0012C (Jacobs Dep. Tr.) at 81; CX-0014C (Mosley Dep. Tr.) at 242-243. Dr. Dauskardt’s testing also shows that [REDACTED] [REDACTED] the colloidal abrasive particles at an equivalent concentration of [REDACTED] in the Accused Products. CX-0006C (Dauskardt WS) at Q/A 466. Accordingly, all Accused Products infringe claim 26.

[REDACTED]

**d. Dependent Claims**

i. **Claim 27: The composition of claim 26, having a pH in a range from about 3.5 to about 6.**

Respondents do not dispute that this limitation is met. *See* Resp. Br. at 66. For the reasons discussed for claims 1 and 26, all Accused Products infringe claim 27. *See* CX-0006C (Dauskardt WS) at Q/A 470.

ii. **Claim 28: The composition of claim 26, wherein the colloidal silica abrasive particles have a permanent positive charge of at least 15 mV.**

Respondents do not dispute that this limitation is met. *See* Resp. Br. at 66. For the reasons discussed for claims 1 and 26, all Accused Products infringe claim 28. *See* CX-0006C (Dauskardt WS) at Q/A 471.

iii. **Claim 29: The composition of claim 26, wherein the colloidal silica abrasive particles have a mean particle size in a range from about 30 to about 70 nm.**

Respondents do not dispute that this limitation is met. *See* Resp. Br. at 66. For the reasons discussed for claims 1, 4, and 26, all Accused Products infringe claim 29. *See* CX-0006C (Dauskardt WS) at Q/A 472.

iv. **Claim 31: The composition of claim 26, comprising less than [a]bout 3 weight percent of the colloidal silica abrasive particles**

Respondents do not dispute that this limitation is met. *See* Resp. Br. at 66. For the reasons discussed for claims 1, 6, and 26, all Accused Products [REDACTED] infringe claim 31. *See* CX-0006C (Dauskardt WS) at Q/A 473.

[REDACTED]

v. **Claim 35: The composition of claim 26, wherein the chemical species comprises from 1 to 6 carbon atoms**

Respondents do not dispute that this limitation is met. *See* Resp. Br. at 66. For the reasons discussed for claims 1, 13, and 26, all Accused Products infringe claim 35. *See* CX-0006C (Dauskardt WS) at Q/A 474.

vi. **Claim 36: The composition of claim 35, wherein the chemical species comprises ethyloxypropylamine, tetramethyl ammonium hydroxide, or ethylenediamine.**

Respondents do not dispute that this limitation is met. *See* Resp. Br. at 66. For the reasons discussed for claims 1, 14, 26, 35, all Accused Products infringe claim 36. *See* CX-0006C (Dauskardt WS) at Q/A 475.

vii. **Claim 37: The composition of claim 26, wherein the aminosilane compound is bonded with less than 4% of silanol groups on the outer surface of the colloidal silica particles.**

Dr. Dauskardt's testing shows that the aminosilane compound in the Accused Products is bonded with [REDACTED] of silanol groups on the outer surface of the colloidal silica particles, as measured by the procedure set forth in the '721 patent. *See* CX-0006C (Dauskardt WS) at Q/A 476–78; JX-0001 ('721 Patent) at 32:61–65; CX-0023C (EAG Analysis Report) at 28, 34, 51, 57; CX-0025C (PTL Analysis Report I) at 3; JX-0267C (CoA for Optiplane 2300A); JX-0268C (CoA for Optiplane 2602); *see also* CX-0006C (Dauskardt WS) at Q/A 478.

Respondents have performed no testing relevant to this claim. Respondents nonetheless argue the claim is not infringed because [REDACTED] colloidal silica abrasive

[REDACTED]

particles in the Accused Products should be treated [REDACTED] for purposes of determining surface area and [REDACTED]

[REDACTED]. *See* Resps. Br. at 66-67.

These arguments are not relevant in view of the guidance in the specification on how to calculate the aminosilane loading. The patent directs a POSA to use a silanol density of all particles of 4.5 SiOH/nm<sup>2</sup> and calculate the amount of APTMS as a percentage of the resulting number of silanols. *See* JX-0001 ('721 Patent) at 32:61-65 ("The amount of APTMS was calculated as a percentage of the number of silanols on the surface . . . of the precursor particle . . . assuming 4.5 SiOH/nm<sup>2</sup>"). None of respondents' arguments are relevant under this procedure. *See* CX-0006C (Dauskardt WS) at Q/A 478. Dr. Dauskardt followed this method, which is what a POSA would have used to determine infringement of the claims. Accordingly, all Accused Products infringe claim 37.

viii. **Claim 39: A method of chemical mechanical polishing a substrate including a silicon oxygen containing material, the method comprising (a) contacting the substrate with the chemical mechanical polishing composition of claim 1; (b) moving the polishing composition relative to the substrate; and (c) abrading the substrate to remove a portion of the silicon oxygen containing material from the substrate and thereby polish the substrate.**

This claim requires a specific use of the composition of claim 1. Respondents do not dispute the limitations of claim 39 are met. *See* Resps. Br. at 64. Indeed, the evidence shows that the [REDACTED] use of the Accused Products, including by respondents in their testing of the Accused Products, infringes claim 39. *See* CX-0006C

(Dauskardt WS) at Q/A 479–81. The claimed method, including all of the contacting, moving, and abrading steps, recites [REDACTED] for the Accused Products for CMP processing of silicon oxygen materials, and therefore this claim is infringed every time respondents, their agents, or any of their customers use the Accused Products for polishing silicon oxygen containing material in the United States. *See, e.g.*, JX-0010 (Dow Announcement) at 2 (DuPont advertising the Accused Products as “Most Advanced Slurries for Dielectric [CMP] Applications”); JX-0185C (Dow Advanced ILD Slurries - OPTIPLANE 2300/2600) at 2 (illustrating the mechanism of oxide CMP with the Accused Products following [REDACTED]).

Further, the evidence shows that respondents test with the Accused Products on [REDACTED]  
[REDACTED]  
[REDACTED]. *See, e.g.*, CX-0007C (Auger Dep. Tr.) at 54-55 (Q: “[I]s it the case that the [REDACTED], for example, has performed [REDACTED] experiments using Optiplane 2300?” A: “Yes, yeah, they have performed those experiments .... most likely, all of them have been tested in [REDACTED]”; CX-0010C (Guo Dep. Tr.) at 188-190 (discussing generating testing results [REDACTED]  
[REDACTED]), 194, 148-149 (discussing JX-0249C (Summary of Competitive Analysis)).

Moreover, respondents’ internal documents show that respondents frequently test their products using the claimed method and that the Accused Products achieve high removal rates for silicon oxygen containing material, a key feature of the products. *See, e.g.*, JX-0174C (OPTIPLANE 2300) at 9, 11, 12 (showing a [REDACTED],

[REDACTED]

[REDACTED] Optiplane 2300 slurry [REDACTED]

JX-0185C (OPTIPLANE 2300/2600) at 20 (showing a [REDACTED])

[REDACTED] Optiplane 2600 slurry [REDACTED] JX-  
0208C (Research Update on ILD CMP Slurry Program) at 15 (showing a [REDACTED])

[REDACTED] Optiplane 2300 slurry [REDACTED]

[REDACTED] JX-0175C (OPTIPLANE 2600 Acidic CMP Slurry) at 13 (showing [REDACTED])

[REDACTED] Optiplane 2300 and Optiplane 2600 slurries [REDACTED]

JX-0177C (OPTIPLANE 2600 DuPont Advanced Acidic ILD Slurry) at 17 (showing a [REDACTED]  
[REDACTED] h Optiplane 2600 slurry at [REDACTED])

[REDACTED]); JX-0219C (Slurry chemistries) at 5 (showing [REDACTED])

[REDACTED] of Optiplane 2600 slurries); JX-0173C (OPTIPLANE 2300 [REDACTED]  
(OPTIPLANE 2602)) at 3 (describing [REDACTED]” as a characteristic of  
OP2602).

Respondents’ documents further show that the Accused Products are also frequently [REDACTED] by customers using the claim method. *See, e.g.*, JX-0179C ([REDACTED]) at 8; JX-0332C [REDACTED] CMP) at 1 (Testing conducted by [REDACTED] on removal rate and selectivity); JX-0341C (Oxide Slurry Proposal for [REDACTED]) at 7 (presenting “[REDACTED] for OP2300 and OP2600 at [REDACTED].

Accordingly, each element of method claim 39 is practiced by the use of the Accused Products.

ix. **Claim 40: The method of claim 39,  
wherein: the polishing composition  
comprises less than 4 percent by weight of**

[REDACTED]

**the colloidal silica abrasive particles; and  
an average removal rate of the silicon  
oxygen material in (c) is greater than  
3000 Å/min at a downforce of 5 psi or less.**

Respondents do not dispute the limitations of claim 40 are met. *See* Resp. Br. at 64-65. This claim is infringed for the reasons discussed above with respect to claims 1, 6, and 39. *See* CX-0006C (Dauskardt WS) at Q/A 482-84. The Accused Products achieve an average removal rate of silicon oxygen material greater than 3000 Angstroms per minute at a downforce of less than 5 psi. *See, e.g.*, JX-0174C (Optiplane 2300) at 12 (showing [REDACTED] Optiplane 2300 slurry data with a [REDACTED]); JX-0173C (OPTIPLANE 2300 [REDACTED] (OPTIPLANE 2602)) at 3 (describing [REDACTED] [REDACTED] as a characteristic of OP2602); JX-0341C (Oxide Slurry Proposal for [REDACTED] at 7 (showing [REDACTED] of OP2300, [REDACTED] and OP2600, [REDACTED] [REDACTED] respectively, [REDACTED]).

Respondents argue that the average removal rate is ambiguous and there may be circumstances where this method is not used. *See* Resp. Br. at 64-65. However, respondents do not dispute that the claimed method is [REDACTED] of the Accused Products, and that the Accused Products [REDACTED] [REDACTED]. *See* CX-0006C (Dauskardt WS) at Q/A 483-484; *Bell Commc 'ns Research, Inc. v. Vitalink Commc 'ns Corp.*, 55 F.3d 615, 622-23 (Fed. Cir. 1995) (“[A]n accused product that sometimes, but not always, embodies a claimed method nonetheless infringes.”).

[REDACTED]

Accordingly, each element of method claim 40 is practiced by the use of the Accused Products.

- x. **Claim 41: The method of claim 39, wherein: the polishing composition comprises less than 2 percent by weight of the colloidal silica abrasive particles; and an average removal rate of the silicon oxygen material in (c) is greater than 3000 Å/min at a downforce of 5 psi or less.**

Respondents do not dispute the limitations of claim 41 are met. *See* Resps. Br. at 64-65. This claim is infringed for the reasons discussed above with respect to claims 1, 6, 39, and 40. *See* CX-0006C (Dauskardt WS) at Q/A 485-86. Thus, each element of method claim 41 is practiced by the use of the Accused Products.

- xi. **Claim 42: The method of claim 39, wherein: the polishing composition comprises less than 3 percent by weight of the colloidal silica abrasive particles; and an average removal rate of the silicon oxygen material in (c) is greater than 2000 Å/min at a downforce of 4 psi or less.**

Respondents do not dispute the limitations of claim 41 are met. *See* Resps. Br. at 64-65. This claim is infringed for the reasons discussed above with respect to claims 1, 6, 39, 40 and 41. *See* CX-0006C (Dauskardt WS) at Q/A 487-88. The Accused Products achieve an average removal rate of silicon oxygen material greater than 2000 Angstroms per minute at a downforce of 4 psi or less. *See, e.g.*, JX-0174C (Optiplane 2300) at 12 (showing [REDACTED] Optiplane 2300 slurry data [REDACTED]). Thus, each element of method claim 42 is practiced by the use of the Accused Products.

[REDACTED]

xii. **Claim 43: The method of claim 39, wherein: the polishing composition comprises less than 2.0 percent by weight of the colloidal silica abrasive particles; and an average removal rate of the silicon oxygen material in (c) is greater than 2000 Å/min at a downforce of 4 psi or less.**

Respondents do not dispute the limitations of claim 41 are met. *See* Resps. Br. at 64-65. This claim is infringed for the reasons discussed above with respect to claims 1, 6, 39, 40 41, and 42. *See* CX-0006C (Dauskardt WS) at Q/A 489–90. Thus, each element of method claim 43 is practiced by the use of the Accused Products.

xiii. **Claim 44: The method of claim 39, wherein: the polishing composition comprises less than 2.5 percent by weight of the colloidal silica abrasive particles; and a removal rate of the silicon oxygen material in (c) is greater than 2000 Å/min at a downforce of 4 psi or less and a removal rate of a silicon nitride material is less than 300 Å/min at a downforce of 3 psi or less.**

Respondents do not dispute the limitations of claim 41 are met. *See* Resps. Br. at 64-65. This claim is infringed for the reasons discussed above with respect to claims 1, 6, 39, 40 41, 42, and 43. *See* CX-0006C (Dauskardt WS) at Q/A 491–93. Further, the Accused Products meet the limitation reciting “removal rate of a silicon nitride material is less than 300 Å/min at a downforce of 3 psi or less.” In particular, [REDACTED] Optiplane 2300 [REDACTED] achieves an TEOS removal rate of [REDACTED] and the removal rate of silicon nitride is [REDACTED]. Optiplane 2600 products behave substantially the same as the Optiplane 2300 products. *See, e.g.,* JX-0185C (Dow Advanced ILD Slurries - OPTIPLANE 2300/2600); JX-0332C ([REDACTED] CMP) at 1 (Testing

conducted by [REDACTED] on removal rate and selectivity); JX-0175C (OPTIPLANE 2600 Acidic CMP Slurry - High purity Next-Gen ILD Platform with Enhanced and Tunable Performance) at 1, 9; JX-0188C (DuPont Advanced Acidic ILD Slurries Optiplane 2300 and 2600 CMP Slurries) at 22; JX-0190C (Optiplane 2300) at 39; JX-0174C (OPTIPLANE 2300) at 15.

Accordingly, each element of method claim 44 is practiced by the use of the Accused Products.

**xiv. Claim 46: The method of claim 39, wherein the polishing composition further comprises a silicon nitrogen polishing inhibitor and a TEOS:SiN polishing rate selectivity is greater than about 25:1.**

This claim is infringed for the reasons discussed above with respect to claims 1, 6, 39, 40 41, 42, 43, and 44. *See* CX-0006C (Dauskardt WS) at Q/A 494–97. The Accused Products also include a silicon nitrogen polishing inhibitor ([REDACTED] and a TEOS:SiN polishing rate selectivity is greater than about 25:1. *Id.*. Optiplane 2300 at [REDACTED] [REDACTED] achieves an TEOS removal rate of [REDACTED] and the removal rate of silicon nitride is [REDACTED]. This leads to a TEOS:SiN selectivity of [REDACTED], meeting the claim limitation. *See* JX-0185C (Dow Advanced ILD Slurries - OPTIPLANE 2300/2600) at 22; CX-0006C (Dauskardt WS) at Q/A 496; *See also* JX-0340C (Optiplane) at 12 (showing a [REDACTED]).

Respondents argue that [REDACTED] is not used in an amount sufficient to act as a silicon nitrogen polishing inhibitor. *See* Resps. Br. at 65. However, the evidence shows that the very reason that [REDACTED] also makes it a SiN

[REDACTED]

suppressor. JX-0207C ([REDACTED] Optiplane 2300) at 2 (describing [REDACTED] [REDACTED] ")). As Dr. Dauskardt explains, silicon nitride is charged positively even in acidic environments, and the positive charges introduced by [REDACTED] lead to repulsive force between the positively charged particles and the positively charged silicon nitride, thus inhibiting its polishing rate. CX-0006C (Dauskardt WS) at Q/A 497.

Accordingly, each element of method claim 46 is practiced by the use of the Accused Products.

#### **4. Indirect Infringement**

For the reasons discussed below, each of the Accused Products, [REDACTED], infringe claims 6, 17, 19–20, 31, and when used by respondents, their agents, or their customers, infringe claim 39–44 and 46.

##### **a. Direct Infringement**

Respondents, their customers, and certain third-party laboratories make, use, and sell the Accused Products and components thereof in the United States that infringe the asserted claims. *See* CX-0006C (Dauskardt WS) at Q/A 505–06.

###### **i. Direct Infringement by Making**

Making a patented invention in the United States without authorization infringes a patent and is actionable under section 337. 19 U.S.C. §1337(a)(1)(B)(i); 35 U.S.C. § 271(a). Respondents infringe the asserted claims by using imported [REDACTED] particles to make the Accused Products in the United States. Respondents' domestic manufacture of these products was confirmed by multiple witnesses. *See, e.g.,* Tr. 294, 295 (Mr. Jacobs

[REDACTED]

testifying: “Q. And DuPont imports the [REDACTED] particles from [REDACTED], right? A. Yes, we do.” and “Q. And then the [REDACTED] particles, [REDACTED]  
[REDACTED], right? A. Yes, they are.”); CX-0012C (Jacobs Dep. Tr.) at 25-26, 102; CX-0015C (McDavitt Dep. Tr.) at 75.

Respondents admit that at least respondent Rohm and Haas Electronic Materials CMP, LLC (formerly known as Rohm and Haas Electronic Materials CMP, Inc.) is involved in [REDACTED]

[REDACTED] of the Accused Products in the United States after they are either imported or manufactured from imported components. *See* JX-0405C (Respondents’ Response to CMC’s Interrogatory Nos. 12, 13, 18); *see also* JX-0007 (Respondents’ Website); JX-0008 (Respondent’s Website); JX-0344C (Revenues in 2017). Specifically, Respondents admit to manufacturing both Optiplane 2300 and Optiplane 2600 in [REDACTED] facility with the imported [REDACTED] colloidal silica abrasive particles. *See* JX-0406C (Respondents’ Oct. 16, 2020 Supp. Response to Interrogatory No. 58) at 30, 32.

## **ii. Direct Infringement by Use**

Use of a patented apparatus or composition by a respondent in the United States after importation without authorization is a type of direct infringement and is a violation of section 337. *Certain Beverage Dispensing Systems & Components Thereof*, Inv. No. 337-TA-1130 (“*Beverage Dispensing Systems*”), Comm’n Op. at 16 (Mar. 26, 2020) (“The Commission finds a violation of section 337 based on ABI’s direct infringement...as explained above, ABI has itself used the NOVA systems in the United States, in violation of 35 U.S.C. § 271(a), when its employees dispensed beer from a

[REDACTED]

NOVA system assembled from the imported components.”). Courts have interpreted the term “use” in 35 U.S.C. § 271(a) broadly to include testing. *See, e.g., Roche Prods., Inc. v. Bolar Pharm. Co.*, 733 F.2d 858, 863 (Fed. Cir. 1984). The Commission does not recognize any exception from liability for infringing use for R&D testing. *Certain Microfluidic Systems*, Inv. No. 337-TA-1100, Comm’n Op. at 87–88 (Mar. 24, 2020). Likewise, respondents directly infringe a patented method in violation of section 337 when they perform the method. *Certain Blood Cholesterol Testing Strips & Associated Systems Containing the Same*, Inv. No. 337-TA- 1116 (“*Testing Strips*”), Comm’n Op. at 29 n.22 (May 1, 2020) (“Congress did not preclude section 337 from covering the ordinary case of post-importation use without post-importation sale.”) (citing *Suprema, Inc. v. U.S. Int’l Trade Comm’n*, 796 F.3d 1338, 1348 (Fed. Cir. 2015) (en banc) and *Certain Apparatus for the Production of Copper Rod*, Inv. No. 337-TA-52, USITC Pub. 1017, Comm’n Op. at 18 (Nov. 23, 1979)).

As discussed below, respondents, their customers of the Accused Products, and third-party laboratories all directly infringe when they use and test the Accused Products in the United States.

### **iii. Direct Infringement by Respondents’ Use**

Respondents perform application testing of the Accused Products that involves conducting polishing experiments in the United States. *See CX-0007C* (Auger Dep. Tr.) at 155. More specifically, respondents have an “[REDACTED]” that does “[REDACTED]” using the Accused Products to generate “[REDACTED]” for the Accused Products. *See CX-0007C* (Auger Dep. Tr.) at 44-45, 54-55; *see also CX-0019C* (Van der Velden Dep. Tr.) at 57. These

[REDACTED]

polishing tests are performed by respondents [REDACTED] [REDACTED].” CX-0019C (Van der Velden Dep. Tr.) at 37. Records of respondents’ internal polishing tests provide many details regarding respondents’ testing and experiments, such as: (a) identification of the Accused Product; (b) physical properties of the Accused Product such as [REDACTED] [REDACTED] [REDACTED] [REDACTED]. See, e.g., JX-0324C (OP2300 Internal Testing Results); JX-0328C (Testing Results); JX-0336C (Testing Results).

Respondents also [REDACTED] of the Accused Products [REDACTED] in their facilities in [REDACTED]. See CX-0019C (Van der Velden Dep. Tr.) at 109. Records of respondents’ [REDACTED] also provide many details regarding respondents’ testing and experiments, such as: (a) identification of the Accused Product; [REDACTED] [REDACTED] [REDACTED] [REDACTED]. See JX-0258C (Troubleshooting Optiplane 2300). The evidence shows direct infringement by respondents.

#### **iv. Direct Infringement by Customers’ Use**

Respondents have numerous customers that use the Accused Products in the United States as a “chemical mechanical composition.” Users of the Accused Products that deploy and make routine use of the Accused Products directly infringe the asserted claims. Indeed, respondents witnesses confirmed that at least [REDACTED]

[REDACTED]

[REDACTED], and [REDACTED] have sampled and tested one of the Accused Products. *See, e.g.*, Tr. 229-230; CX-0015C (McDavitt Dep. Tr.) at 84, 87-88. For example, [REDACTED] started using and testing OP2300 and recently started using OP2602 in the United States; [REDACTED] is using OP2602 in the United, and [REDACTED] is testing and running low-volume early production using OP2300A in the United States. *See, e.g.*, Tr. 300 (Mr. Jacobs testifying: “Q. And one of those customers is [REDACTED]? A. That is correct. Q. And [REDACTED] is a customer in the United States, right? A. Yes, they are.”); *see also* CX-0015C (McDavitt Dep. Tr.) at 20-21, 23, 35, 42, 105-106.

Respondents argue that it does not know how customers are using the Accused Products and that the Accused Products could allegedly be modified so they are no longer infringing. However, as further described below regarding inducement, this argument disregards the evidence that respondents’ customers use the Accused Products as

[REDACTED]. Moreover, there is no dispute that customers are looking to achieve specific parameters and [REDACTED] [REDACTED] the Accused Products to meet those specific parameters, which are squarely within the scope of the claims. Indeed, respondents have sales and field service engineering teams that [REDACTED] [REDACTED] s for the Accused Products. *See* CX-0019C (Van der Velden Dep. Tr.) at 60.

v. **Direct Infringement by Third-Party Lab’s Use**

There is no dispute that respondents have hired a third-party lab, [REDACTED] [REDACTED] to conduct tests and polishing experiments using the Accused Products. *See* Resp. Br. at 70; CX-0007C (Auger Dep. Tr.) at 103;

[REDACTED]

JX-0286 (ILD Slurry Plan); JX-0219C (Design of Slurry Chemistries). Contrary to respondents' argument, the polishing tests done by [REDACTED] on respondents' behalf included measuring and collecting data such as [REDACTED]  
[REDACTED]. These activities are also direct infringement of the '721 patent.

**vi. Direct Infringement by Domestic Sale**

The sale of a product that practices a U.S. patent without permission is another act of direct infringement that is actionable under section 337. *See* 19 U.S.C. § 1337(a)(1)(B)(i), 35 U.S.C. § 271(a). Respondents also infringe the '721 patent through its domestic sale of the Accused Products. Respondents admit that after using the imported particles to make and use the Accused Products, respondents sell samples of the Accused Products to customers and others in the United States. *See* Tr. 300 (Mr. Jacobs testifying: "Q. And one of those customers is [REDACTED]? A. That is correct."); CX-0015C (McDavitt Dep. Tr.) at 84, 87-88; JX-0272C (Sales & StdMargin – Adhoc Financial Analysis); JX-0211C (Optiplane 2300 Acidic CMP Slurry for [REDACTED] CX-0045C (Respondents' Response to CMC's Interrogatory No. 67) (admitting Accused Product have been [REDACTED])  
[REDACTED]  
[REDACTED]  
[REDACTED]

[REDACTED]

**vii. Additional *Testing Strips* Factors Related to Direct Infringement**

In *Testing Strips*, additional factors were identified as related to the issue of direct infringement: (1) “the nature of the imported items;” (2) “what additional activity occurs in the United States, including any combinations or modifications that are made with respect to the imported articles after importation, all in light of the limitations of the asserted claims;” and (3) “[i]n any future investigations in which the Commission is presented with the issue of post- importation direct infringement by the respondent as the basis for the 337 violation … it is appropriate to consider the extent, if any, to which the accused products are modified or combined with other non-accused articles after importation in order to satisfy all of the elements of the asserted claim.” *See Testing Strips*, Comm’n Op. at 33 n.26, n.27. The evidence here also shows that these factors also warrant a finding of direct infringement.

Regarding the first *Testing Strips* factor—the nature of the imported items—colloidal silica particles are [REDACTED] of the Accused Products in terms of [REDACTED]. *See Testing Strips*, Comm’n Op. at 33 n.26 [REDACTED] colloidal silica particles alone account for [REDACTED] of the Accused Products [REDACTED] [REDACTED] of the Accused Products.<sup>32</sup> *See JX-0229C* (Optiplane 2300 Formulation); *JX-0254C* (Slurry Cost- Price Estimate) at “HVM Cost” Tab; *JX-0278C* (Optiplane 2600 Formulation).

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<sup>32</sup> The Optiplane 2300 product family [REDACTED] includes [REDACTED] colloidal silica particles (*see JX-0263C* (OP2300 Technical Team Meeting) at 11) and the Optiplane 2600 product family [REDACTED] includes [REDACTED] colloidal silica particles (*see JX-0278C* (Optiplane 2600 Formulation)), [REDACTED].

[REDACTED]

Within the CMP slurries into which they are incorporated, these colloidal silica particles are the component that “[REDACTED]” [REDACTED]  
[REDACTED]. See CX-0007C (Auger Dep. Tr.) at 86; Tr. 697; JX-0001 ('721 Patent) at 1:50–53 (“Polishing of the substrate is generally aided by the chemical activity of the polishing composition (e.g., by a chemical accelerator) and/or the mechanical activity of an abrasive suspended in the polishing composition.”); JX-0176C (CMP Slurry Update) at 4 (describing [REDACTED] particles as a “[REDACTED]”); JX-0207C ([REDACTED] OPTIPLANE 2300 - Advanced Acidic ILD Slurry, dated March 1, 2017) at 2 (describing [REDACTED] particles as “[REDACTED]”). In other words, [REDACTED] colloidal silica particles are a material and necessary component of the Accused Products, without which the intended purpose of the claimed invention could not be achieved.

The importance of the imported [REDACTED] particles to the claimed invention also is evident when viewed “in light of the limitations of the asserted claims.” *Testing Strips*, Comm'n Op. at 33, n.26. To be sure, claims 1 and 26 expressly recite “colloidal silica abrasive particles” that include a “chemical species” with “permanent positive charge” and, as discussed above, the [REDACTED] particles represent the [REDACTED] of the colloidal silica particles [REDACTED] in the Accused Products. See JX-0001 ('721 Patent) at 39:66–67, 40:1–4, 40:6–9, 41:52–57.

The facts here also support a finding of direct infringement under the second *Testing Strips* factor — “what additional activity occurs in the United States, including any combinations or modifications that are made with respect to the imported articles after importation.” *Testing Strips*, Comm'n Op. at 33 n.26. More specifically,

[REDACTED]

independent claims 1 and 26 of the ‘721 patent recite that the claimed colloidal silica abrasive particles are “dispersed in [a] liquid carrier.” *See* JX-0001 (“721 Patent) at 39:66–67, 41:52–53. Independent claim 26 further recites that “an aminosilane compound is bonded with the outer surface of the colloidal silica abrasive particles.” *Id.* at 41:61–62. These recitations correspond to the additional activity that occurs in the United States with respect to the imported [REDACTED] particles.

The third factor raised in *Testing Strips* also is satisfied, as set forth in respondents’ statements, “the [REDACTED] particles are imported into the U.S. and then combined with other non- accused components in the U.S. to make the final, saleable slurry product.” *See* JX-0406C (Respondents’ 6th Suppl Obj. and Rspns. to 3rd Set of ROGs) at 32. This includes mixing the [REDACTED] particles [REDACTED]  
[REDACTED], as recited in claim 26. *See* CX-0006C (Dauskardt WS) at Q/A 466; Tr. 295–296 (Mr. Jacobs testifying: “Q. Now, you testified that [REDACTED]

[REDACTED] A. Correct.”); CX-0010C (Guo Dep. Tr.) at 179; CX-0012C (Jacobs Dep. Tr.) at 81; CX-0014C (Mosley Dep. Tr.) at 242–243.

DuPont employee Kevin Jacobs states that the [REDACTED] particles are [REDACTED]  
[REDACTED]. *See* RX-1398C (Jacobs RWS) at Q/A 24–25. Yet, as DuPont employee Dr. Yi Guo explained, the first “use” of the [REDACTED] particles after importation is [REDACTED]  
[REDACTED]. *See* CX-0010C (Guo Dep. Tr.) at 231; Tr. 294–295. This [REDACTED] step is the first step of the manufacturing process for the Accused Products. *See id.* Thus, to the extent that [REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED] particles is considered a [REDACTED] of the [REDACTED] particles, that [REDACTED]  
[REDACTED]  
[REDACTED], as Mr. Jacobs suggests.

Moreover, the manufacturing process for the Accused Products leaves the relevant “as imported” characteristics of the [REDACTED] particles intact. [REDACTED]  
[REDACTED]  
[REDACTED]. In fact, respondents deliberately [REDACTED] particles for the Accused Products so they would already have these characteristics “as imported” by DuPont.<sup>33</sup> See e.g., CX-0007C (Auger Dep. Tr.) at 89; JX-0231C (Update on New [REDACTED] Particle) at 2; JX-0212C (Optiplane 2300 Poster Presentation); JX-0176C (CMP Slurry Update) at 4. Thus, importation of the [REDACTED] [REDACTED] particles supplied to respondents to directly infringe the ‘721 patent is, independently, a violation of section 337. See *Testing Strips*, Comm’n Op. at 32 n.25 (citing *Suprema*, 796 F.3d at 1352-1353); see also 19 U.S.C. § 1337(a)(1)(B)(i).

**b. Induced and Contributory Infringement**

**i. Knowledge**

Both inducement and contributory infringement require that the respondents knew or at least were willfully blind to fact that their actions would induce or contribute to the direct infringement of the ‘721 patent. *Global-Tech Appliances, Inc. v. SEB S.A.*, 563

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<sup>33</sup> As Mr. Jacobs confirmed, the [REDACTED] particles have [REDACTED] This is consistent with Dr. Klein and Dr. Raghavan who each opine the importance of the positive charge being internal to the claimed colloidal silica particles. See RX-1076C (Raghavan WS) at Q/A 88, 93; RX-1076C (Raghavan WS) at Q/A 866.

U.S. 754, 768-769 (2011). As discussed above, there is no dispute that respondents have known of the ‘721 patent since [REDACTED]

[REDACTED]. *See JX-0405C (Respondents’ Discovery Responses) at 63; CX-0008C (Chu Dep. Tr.) at 205–206; CX-0010C (Guo Dep. Tr.) at 93–94; CX-0007C (Auger Dep. Tr.) at 78; Tr. 228–229.* Respondents also have had direct knowledge of their infringement of the ‘721 patent since at least April 13, 2020, when CMC sent a claim chart detailing infringement. *See CX-0048C (Ltr from CMC to respondent).* Respondents’ knowledge of the ‘721 patent as of institution of this investigation is further proof.

Further, the evidence shows that respondents knew, or were willfully blind to the fact, that the Accused Products may infringe the ‘721 patent. First, it was routine for respondents to [REDACTED] products during development. *See, e.g., JX-0249C (Summary of [REDACTED])*

Second, the timeline of events shows that respondents were well-aware of the ‘721 patent during their development of the Accused Products. In fact, as discussed above, soon after learning of the ‘721 patent, including its description of a [REDACTED] particle and a “high purity particle from Fuso,” [REDACTED]

[REDACTED] *See CX-0006C (Dauskardt WS) at Q/A 501; JX-0178C (DuPont Technical Review); JX-0212C (Optiplane 2300 Poster Presentation).* It appears respondents followed CMC’s invention even though they had identified [REDACTED]  
[REDACTED]. *See JX-181C (DuPont Presentation); CX-0006C (Dauskardt WS) at Q/A 503.*

[REDACTED]

**ii. Inducement**

“Whoever actively induces infringement of a patent shall be liable as an infringer.” *Certain Biometric Scanning Devices, Components Thereof, Associated Software, & Products Containing the Same*, Inv. No. 337-TA- 720, Comm’n Op. at 5 (Nov. 10, 2011) (citing 35 U.S.C. § 271(b)). To be liable for inducement, a respondent must have acted with specific intent to encourage direct infringement by another, which may be shown with circumstantial evidence. *See Commil USA LLC v. Cisco Systems, Inc.*, 135 S. Ct. 1920, 1926 (2015); *Eli Lilly & Co. v. Teva Parenteral Meds., Inc.*, 845 F.3d 1357, 1368 (Fed. Cir. 2017).

As discussed below, the record evidence shows that respondents induced the direct infringement of the ‘721 patent by multiple third parties, including respondents’ own subsidiaries, respondents’ customers, and third-party labs.

**Inducement of Respondents’ Subsidiaries**

Certain respondents, including DuPont de Nemours, Inc. and Rohm and Haas Electronic Materials K.K., actively induce other respondent subsidiaries, including at least Rohm and Haas Electronic Materials CMP in Delaware to infringe the ‘721 patent. *See Testing Strips*, Comm’n Op. at 32 n.25. Specifically, employees of DuPont de Nemours, Inc. and subsidiary Rohm and Haas Electronic Materials K.K. of Japan

[REDACTED]

[REDACTED] with the intention that they will be used in the United States by Rohm and Haas Electronic Materials CMP LLC to manufacture infringing CMP slurries, which are then used in an infringing manner in the United States by both Rohm and Haas Electronic Materials CMP LLC and its customers. *See JX-0349C* ([REDACTED] Importations); *see also CX-*

[REDACTED]

0011C (Hutchinson Dep. Tr.) at 171–172, 175–176, 181, 182, 183; JX-0054 (Shipment Details/Rohm/US Imports, Panjiva, Apr. 2020); Tr. 293–294.

Indeed, the imported [REDACTED] colloidal silica particles that respondents import is both a [REDACTED] “ of the Accused Products and also comprises a [REDACTED] [REDACTED] of the CMP infringing slurries. *See* JX-0207C (2017 Optiplane 2300 Presentation) at 2; JX-0176C (CMP Slurry Update) at 4; CX-0006C (Dauskardt WS) at Q/A 334–35. The importation of this [REDACTED] component of the Accused Products induces infringement and, therefore, violates section 337. *See, e.g., Testing Strips*, Comm'n Op. at 32 n.25; *see also Suprema*, 796 F.3d at 1349, 1352–1353 (“[A]rticles that infringe” include “goods that were used by an importer to directly infringe post-importation as a result of the seller’s inducement.”). Therefore, DuPont de Nemours, Inc. and Rohm and Haas Electronic Materials K.K. induce the direct infringement of the ‘721 patent in the United States through their actions, and also contribute to such infringement by supplying a component that respondents control for purposes of making the Accused Products.

### **Inducement of Customers**

There is evidence that respondents induce infringement by respondents’ United States customers. *See Beverage Dispensing Systems*, Comm'n Op. at 13 (“[E]vidence of customer direct infringement” can be “circumstantial,” “based upon [Respondents’] undisputed sales..., instructions..., and lack of any non-infringing combinations....”). Respondents supply their customers with the Accused Products and [REDACTED] the Accused Products in a manner that infringes both the asserted composition and method claims. The record evidence shows that respondents are [REDACTED] [REDACTED] with their customers’ CMP slurry requirements, and [REDACTED]

[REDACTED]  
[REDACTED] to their customers specifically on how to use the Accused Products in an infringing manner. *See, e.g.*, JX-0187C (Optiplane 2300/2600 [REDACTED]); JX-0248C (Optiplane 2300/2600 [REDACTED]); JX-0211C (Optiplane Presentation for [REDACTED]); JX-0257C (Optiplane 2300 [REDACTED]);<sup>34</sup> Tr. 300.

First, respondents market, distribute, and/or sell the Accused Products to customers with [REDACTED] the Accused Products, which results in infringement. For example, respondents provide [REDACTED] to their customers with [REDACTED]

[REDACTED] *See, e.g.*, JX-0187C (Optiplane 2300/2600 Handling Instructions) at 8; JX-0189C (Slurry Dilution and Mixing [REDACTED]) at 9–18; JX-0337C (OP2300 [REDACTED]  
[REDACTED]); JX-0248C (OP2300/2600 [REDACTED]). These [REDACTED] also recommend [REDACTED]

[REDACTED] that a customer may try. *See* CX-0019C (Van der Velden Dep. Tr.) at 111, 112.

Further, it is a common practice for respondents to test the Accused Products extensively to generate examples of [REDACTED]  
[REDACTED]. *See* JX-0225C (Benchmark Analysis); CX-0019C (Van der Velden Dep. Tr.) at 33, 34, 37, 38, 44; CX-0007C (Auger Dep. Tr.) at 234, 235. Respondents also frequently [REDACTED] from their own experiments (*e.g.*, the [REDACTED] described above) as [REDACTED]

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<sup>34</sup> Respondents also advertise and promote use of their products in an infringing manner. JX-0007 (respondents' Website); JX-0008 (respondents' Website); JX-0212C, (Optiplane 2300 Poster Presentation).

[REDACTED] See CX-0019C (Van der Velden Dep. Tr.) at 22, 23. Thus,

respondents are familiar with how their customers use the Accused Products.

Second, respondents are familiar with the properties of the CMP slurries used by their customers. Indeed, respondents [REDACTED]

[REDACTED] with the Accused Products through presentations, telephone calls, technical review meetings, or [REDACTED]. See JX-0317C (Log of biweekly call with [REDACTED]; JX-0318C (Log from [REDACTED] call); CX-0007C (Auger Dep. Tr.) at 244–246, 248; CX-0019C (Van der Velden Dep. Tr.) at 145–146. Multiple respondent witnesses confirmed that typical [REDACTED]

[REDACTED]. See CX-0007C (Auger Dep. Tr.) at 45–46; CX-0015C (McDavitt Dep. Tr.) at 33–34, 36–38. Respondents also admit to having a product quality engineering team located in [REDACTED]

[REDACTED] regarding the infringing slurries. See CX-0019C (Van der Velden Dep. Tr.) at 56.

Respondents argue that “customers themselves may choose how to dilute and use the Accused Products.” See Resp. Br. at 71. It is undisputed that respondents

[REDACTED] to customers that bring the products squarely within the claim scope. This was confirmed by numerous respondent witnesses, including Mr. Kevin Jacobs, global product scale up manager, who testified that respondents [REDACTED] [REDACTED] to customers, and that he was not aware of [REDACTED] [REDACTED], which brings the Accused Products within the claim scope.

See CX-0012C (Jacobs Dep. Tr.) at 52; 233; Tr. 300.

[REDACTED]

The evidence in this case is far from the “hypothetical infringement” discussed in *Dynacore Holdings Corp. v. U.S. Philips Corp.*, 363 F.3d 1263, 1274 (2004) as respondents suggest. As discussed above, there is direct infringement by respondents’ customers and respondents induce this infringement by supplying them with the Accused Products and [REDACTED] the Accused Products in a manner that infringes the claims. In light of the above, respondents knowingly induced infringement of the ‘721 patent with specific intent to do so, including by providing components in the United States to assemble and/or make infringing products, selling these products to United States customers for use in the United States and otherwise intentionally causing direct infringement.

### **Inducement of Third Party Testing Labs**

Respondents also actively induced a third-party laboratory to use and test the Accused Products. Multiple respondent witnesses testified that respondents told [REDACTED] to test the Accused Products in the United States [REDACTED] [REDACTED]. See CX-0007C (Auger Dep. Tr.) at 102, 103, 256, 257, 258; CX-0010C (Guo Dep. Tr.) at 143; JX-0286C (ILD Slurry Plan) at 10; JX-0219C (Design of Slurry Chemistries). Specifically, the evidence shows that respondents told [REDACTED]  
[REDACTED]  
[REDACTED]. Thus, the evidence shows that respondents also actively induced a third-party testing laboratory [REDACTED] to use an Accused Product in the United States, and thus infringe the ‘721 patent.

[REDACTED]

**iii. Contributory Infringement**

The evidence shows that respondents have also contributed to the infringement of the ‘721 patent. Contributory infringement under section 337 can be shown if “(1) there is an act of direct infringement in violation of Section 337; (2) the accused device has no substantial non-infringing uses; and (3) the accused infringer imported, sold for importation, or sold after importation within the United States, the accused components that contributed to another’s direct infringement.” *Spansion, Inc. v. Int’l Trade Comm’n*, 629 F.3d 1331, 1353 (Fed. Cir. 2010); 19 U.S.C. § 1337(a)(1)(B).

As discussed above, certain respondents, including DuPont de Nemours, Inc. and subsidiaries Rohm and Haas Electronic Materials CMP LLC and Rohm and Haas Electronic Materials K.K. of Japan, cause to be imported into the United States from [REDACTED] the [REDACTED] particle component of the Accused Products. Rohm and Haas Electronic Materials CMP LLC combines the [REDACTED] particle with other components of the Accused Products. Direct infringement in the United States is established when (1) Rohm and Haas Electronic Materials CMP LLC makes, uses, sells, and tests the Accused Products; (2) respondents’ customers use and test the Accused Products; and (3) [REDACTED] a third-party laboratory, uses and tests the Accused Products in the United States. *See, e.g., Testing Strips, Comm’n Op.* at 32 n.25 (finding that “the foreign respondent ... contributed to the infringement of the asserted claims by supplying the Accused Products to [the domestic respondent] for its use in directly infringing ... after importation into the United States”).

The evidence shows that respondents satisfy each of the factors of contributory infringement, the first of which (an act of direct infringement) was already addressed.

Regarding the second factor, neither the Accused Products nor the imported [REDACTED] particles have any substantial non-infringing use. *See CX-0007C* (Auger Dep. Tr.) at 85. Respondents import [REDACTED] colloidal silica particles that are specifically designed and tailored for respondents to use in respondents' Accused Products. [REDACTED] is not an off-the-shelf commodity product.

Respondents had several rounds of [REDACTED]

[REDACTED]<sup>35</sup>

*See, e.g., CX-0018C* (Umberger Dep. Tr.) at 89–95, 98, 101–106, 107–108, 109–110, 117–118, 127–128, 137–139, 139, 141–142; *CX-0008C* (Chu. Dep. Tr.) at 84–86; JX-

0314C (Chart Showing [REDACTED] Specification Proposals); JX-0315C (Specification Agreement); JX-0316C (Draft [REDACTED] Specification Agreement for Respondents); JX-0323C (Signed [REDACTED] Specification Agreement). Respondents [REDACTED]

[REDACTED]. *See JX-*

0299C ([REDACTED] Closing Meeting); JX-0302C (2019 [REDACTED] ARs); JX-0345C (supplier quality agreement specifying [REDACTED])

[REDACTED]).

35 [REDACTED]

[REDACTED] CX-0018C (Umberger Dep. Tr.) at 154. Respondents work closely with [REDACTED] and hold [REDACTED] technical meetings. *See, e.g., JX-0309C* (Monthly Report); JX-0311C (Q2 2020 meeting); JX-0313C ([REDACTED] Presentation); JX-0307C (Monthly Report); JX-0306C (Troubleshooting Request). Respondents have worked with [REDACTED]

[REDACTED]. *See, e.g., JX-0231C* (Update on New Particle) at 2 (November 2019 presentation describing [REDACTED])

[REDACTED] CX-0040 (respondents' discovery response to Interrogatory No. 77 describing the same). [REDACTED] and respondents have also signed a confidentiality agreement. JX-0354C (Confidential Information Disclosure Agreement); JX-0353C (Amendment to Agreement); JX-0355C (same); JX-0356C (same).

[REDACTED]

Indeed, respondents have identified no other use for the [REDACTED] particles than to be made into the Accused Products, and the Accused Products in turn have no use other than to be used for CMP as described in the ‘721 patent. *See CX-0007C* (Auger Dep. Tr.) at 218–219. For at least these reasons the [REDACTED] particles are especially made for infringement of the ‘721 patent and are not a staple article. *See CX-0006C* (Dauskardt WS) at Q/A 175–190, 513–514.

Respondents argue that [REDACTED] particles are also provided to Sumitomo and Fujimi, and thus, the [REDACTED] particles are not especially made for an infringing use. *See* Resp. Br. at 73, 75. However, respondents have not shown that any [REDACTED] particle is actually used or implemented in a non-infringing manner. Indeed, the evidence shows the contrary—that DuPont specifically [REDACTED] particle for use in its Optiplane slurries, and the [REDACTED] particles that DuPont receives were [REDACTED] made for DuPont. *See CX-0012C* (Jacobs Dep. Tr.) at 133 (“Q:...[O]nce somebody at DuPont...comes up with the [REDACTED]  
[REDACTED]; is that right? A: Correct”). Further, respondents argue that respondents have no “control” over [REDACTED] manufacturing process. This argument disregards the substantial evidence discussed above showing respondents’ [REDACTED] regarding the parameters of the [REDACTED] particles.

Finally, importation of the accused BS-3 particles is not disputed. *See CX-0006C* (Dauskardt WS) at Q/A 191–92, 512; *CX-0007C* (Auger Dep. Tr.) at 88. Thus, respondents satisfy the factors for contributory infringement. As discussed above, each

[REDACTED]

of the respondents knew that the combination of the BS-3 particles with other ingredients was patented, and each of the respondents knew of the ‘721 patent.

In sum, the evidence has shown that respondents, including Rohm and Haas Electronic Materials K.K. in Japan, contribute to the infringement of the United States respondents, and all respondents contribute to the infringement of respondents’ United States customers and the third-party laboratory that performs testing in the United States, through their importation of components such as the [REDACTED] particles, and the Accused Products themselves, into the United States. *See CX-0006C (Dauskardt WS) at Q/A 511.*

**iv. Whether the [REDACTED] Precludes Infringement**

Respondents argue that [REDACTED] precludes CMC from enforcing the ‘721 patent against Fuso silica particles falling outside the scope of [REDACTED]. *See* Resps. Br. at 76. Respondents argue that “the [REDACTED] bars CMC from alleging infringement of the ’721 patent based on [REDACTED].” *Id.* Respondents argue that the [REDACTED] allegedly “bars CMC from alleging infringement” of [REDACTED] and are allegedly identified as [REDACTED]. *Id.* Respondents concede that BS-3 particles did not exist at the time of [REDACTED] and were not even introduced until 2015. *See RX-1402C (Raghavan RWS) at Q/A 39.* Moreover, [REDACTED] [REDACTED] “are expressly defined to mean [REDACTED] [REDACTED]. *See JX-0111C* [REDACTED] at §7.3(a), 7.4(a). The [REDACTED] does not limit CMC’s ability to allege infringement of CMC’s slurry IP. To the contrary, the [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED].” *Id.* at §17.2.

### C. Domestic Industry (Technical Prong)

As discussed above, with respect to domestic industry, CMC asserts claims 1, 3–11, 13–21, 23, 26–29, 31–36, and 38–44. *See* Compl. Br. at xix, 92–93.

As discussed below, the DI Products practice claims 1, 3–5, 7–11, 13–16, 18, 23, 26–29, 32–36, and 38. Moreover, each of the DI Products, at its POU concentration, practices claims 6, 17, 19–21, and 31, and when used by CMC, or its customers, practices claims 39–44.

#### 1. Applicable Law

A violation of section 337(a)(1)(B), (C), (D), or (E) can be found “only if an industry in the United States, with respect to the articles protected by the patent, copyright, trademark, mask work, or design concerned, exists or is in the process of being established.” 19 U.S.C. § 1337(a)(2). Section 337(a) further provides:

(3) For purposes of paragraph (2), an industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the patent, copyright, trademark, mask work, or design concerned—

- (A) significant investment in plant and equipment;
- (B) significant employment of labor or capital; or
- (C) substantial investment in its exploitation, including engineering, research and development, or licensing.

19 U.S.C. § 1337(a)(3).

These statutory requirements consist of an economic prong (which requires certain activities) and a technical prong (which requires that these activities relate to the

[REDACTED]

intellectual property being protected). *Stringed Musical Instruments*, Comm'n Op. at 13.

The burden is on the complainant to show by a preponderance of the evidence that the domestic industry requirement is satisfied. *Navigation Devices*, Comm'n Op. at 5.

“To determine the relationship between a domestic industry and protected articles (the ‘technical prong’ of the domestic industry requirement), the Commission determines whether the industry produces articles covered by the asserted claims.” *Crocs, Inc.*, 598 F.3d at 1306-07.

The test for the technical prong of the industry requirement “is essentially the same as that for infringement, *i.e.*, a comparison of domestic products to the asserted claims.” *Alloc*, 342 F.3d at 1375. “In other words, the technical prong requires proof that the patent claims cover the articles of manufacture that establish the domestic industry. Put simply, the complainant must practice its own patent.” *Crocs, Inc.*, 598 F.3d at 1307.

It is sufficient to show that the domestic industry practices any claim of the patent, not necessarily an asserted claim. *Microsphere Adhesives*, Comm'n Op. at 7-16.

## **2. Domestic Industry Products**

There is no dispute that CMC’s DI Products include the D922x family products, including D9228, D9222, D9225, D9228 7.5 X, [REDACTED] and developments and improvements thereof. *See* Compl. Br. at 9; Resps. Br. at 14-15; Staff Br. at 15; CX-0001C (Woodland DWS) at Q/A 8. All of these products include [REDACTED] colloidal silica abrasive particles. *See* CX-0002C (Grumbine DWS) at Q/A 30.

CMC’s iDIEL™ D922X family products, including iDIEL™ D9228, D9222, D9225, D9228 7.5 X, [REDACTED] demonstrate CMC’s domestic industry in the ‘721 patent and practice the DI Claims, 1, 3–11, 13–21, 23, 26–29, 31–36, and 38–44.

[REDACTED]

*See CX-0006C (Dauskardt WS) at Q/A 517–19. As Dr. Dauskardt explained, and respondents do not dispute, all of these products include [REDACTED] colloidal silica abrasive particles, and D9228 is representative with respect to the DI Claims. See Resp. Br. at 14–15; CX-0006C (Dauskardt WS) at Q/A 519–25.*

The specific formulation of each DI Product is summarized at CDX-0006C.00121 (CX-0006C (Dauskardt WS) at Q/A 518; JX-0093C ([REDACTED]  
[REDACTED] JX-0099C [REDACTED]); JX-  
0098C ([REDACTED])); JX-0069C [REDACTED]  
[REDACTED])). As seen with the [REDACTED], the DI Products often are made at [REDACTED] of colloidal silica particles to reduce the cost of transportation and shipping to customer sites and then made and used at around [REDACTED] of colloidal silica particles, the POU. *See CX-0006C (Dauskardt WS) at Q/A 519–21.*

### **3. Independent Claim 1**

#### **a. A chemical mechanical polishing composition comprising**

Respondents do not dispute that the preamble is met by the DI Products. *See* Resp. Br. at 80–81; RX-1402C (Raghavan RWS) at Q/A 309–318. Evidence shows that the DI Products are chemical mechanical polishing compositions. *See CX-0006C (Dauskardt WS) at Q/A 526–530; JX-0020 (iDIEL D9228 CMP Slurry); JX-0100C (iDIEL™ D9228 ILD CMP Polishing Slurry); JX-0093C [REDACTED]  
[REDACTED] at 3; JX-0070C [REDACTED]) at 1.*

[REDACTED]

**b. a water based liquid carrier**

Respondents do not dispute that this limitation is met. *See* *Resps. Br.* at 80-8.

The DI Products comprise a water based liquid carrier. *See CX-0006C* (Dauskardt WS)

at Q/A 531; JX-0021 (Safety Data Sheet of iDIEL D9228) at 3; JX-0099C ([REDACTED])

[REDACTED] at 4; JX-0023C (D9228 Production Formula) at 2 (DI

Products are made using “DI water.”).

**c. colloidal silica abrasive particles dispersed in the liquid carrier**

None of respondents’ experts disputes this limitation is met by the DI Products under any party’s proposed constructions. *See RX-1402C* (Raghavan RWS) at Q/A 309–

18; CX-0006C (Dauskardt WS) at Q/A 533–36. The DI Products each includes colloidal

silica abrasive particles, specifically [REDACTED] particles, dispersed in water. *See, e.g., JX-*

0021 (Safety Data Sheet of iDIEL D9228) at 3; JX-0020 (iDIEL D9228 CMP Slurry);

JX-0099C ([REDACTED]) at 4; JX-0104C ([REDACTED])

[REDACTED] at 1; JX-0101C ([REDACTED]) at 5; CX-0073C ([REDACTED])

[REDACTED] at 1; JX-0069C ([REDACTED]) at

4; CX-0002C (Grumbine WS) at Q/A 33. Even under respondents’ product-by-process

construction of “colloid silica abrasive particles,” this limitation is satisfied because [REDACTED]

[REDACTED] are made using a wet process. *See CX-0006C* (Dauskardt WS) at Q/A 535;

JX-0062C ([REDACTED]) at 4.

[REDACTED]

d. **a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof, wherein the chemical species is a nitrogen containing compound or a phosphorus containing compound**

This limitation is met by the DI Products under any party's proposed constructions. Respondents do not dispute this. *See* Resp. Br. at 80-81; RX-1402C (Raghavan RWS) at Q/A 309–318; CX-0006C (Dauskardt WS) at Q/A 537–544. The [REDACTED] colloidal silica abrasive particles are “positively-charged particles.” *See* CDX-0006C.00124 (CX-0006C (Dauskardt WS) at Q/A 537; JX-0022 (D9228 website)). The [REDACTED] colloidal silica abrasive particles include multiple chemical species, including [REDACTED], which is a nitrogen containing compound incorporated internal to the outer surface of the [REDACTED] particles. *See* CX-0006C (Dauskardt WS) at Q/A 538. The [REDACTED] particles are made under such conditions that [REDACTED]. *See, e.g.*, JX-0062C ([REDACTED]) at 4; JX-0418C (Colloidal Silica Particles) at 3; JX-0059C (D9228 spreadsheet); JX-0060C (D9228 DOE) and JX-0084C (Particle Data). Moreover, Dr. Dauskardt’s testing shows that [REDACTED] is incorporated internal to the outer surface of the colloidal silica abrasive particles. *See* CX-0023C (EAG Analysis Report) at 80; CX-0006C (Dauskardt WS) at Q/A 236–37, 542.

e. **a pH in a range from about 3.5 to about 6;**

Respondents do not dispute that this limitation is met. *See* Resp. Br. at 80-81; RX-1402C (Raghavan RWD) at Q/A 309–318. The documents and Dr. Dauskardt’s testing show the DI Products comprise a pH in a range from about 3.5–6. *See, e.g.*, CX-0006C (Dauskardt WS) at Q/A 545–547; CX-0024C (DTI Analysis Report) at 11; CX-

[REDACTED]

0026C (PTL Analysis Report II) at 3–5; JX-0021 (D9228 Safety Data Sheet) at 4 (describing a pH of between 4.0 and 5.0 for the D9228 products); JX-0024C (Product Specification iDIEL™ D9228) (showing a pH in a range of [REDACTED]); JX-0120C (Certificate of Analysis for iDIEL D9228); JX-0091C (D9228 Spreadsheet); JX-0035C (D9228 Manufacturing Data). The same pH range applies for all the DI Products. *See* JX-0103C (D9225/D9222 Product Specification); JX-0121C (D9225 Certificate of Analysis); JX-0101C ([REDACTED]) JX-0090C (D9225 Quality Control data); CX-0073C (Product Specification) (describing a pH [REDACTED] at 1; JX-0097C (Product Specification) at 1 (describing a pH of [REDACTED] for [REDACTED]). The DI Products practice this limitation at POU and as concentrated. *See* CX-0006C (Dauskardt WS) at Q/A 546; JX-0102C (D9225 study) at 6; JX-0038C (D9228 Study); JX-0048C ([REDACTED] study); JX-0072C ([REDACTED] study).

**f. wherein the colloidal silica abrasive particles have a permanent positive charge of at least 15 mV; and**

This limitation is met by each of the DI Products under any party's proposed constructions. *See* CX-0006C (Dauskardt WS) at Q/A 548–561. Dr. Dauskardt's testing confirms that the DI Products have a permanent positive charge of the [REDACTED] particles greater than 15 mV. Tr. 750–751 (Dr. Dauskardt testifying: “Q. And did you oversee zeta potential measurements of the accused products and domestic industry products? A. Yeah, I spent hours on zoom overseeing measurements of two different instruments. . . . [W]e measured, I think there were three samples from the accused products and two from domestic industry, and we made multiple measurements [on] those.”); *see also* CX-0006C (Dauskardt WS) at Q/A 548–550; CX-0024C (DTI Analysis Report) at 11; CX-

[REDACTED]

0026C (PTL Analysis Report II) at 3–5. As Dr. Dauskardt explains, the triple filtration test he used also shows that “positive charge of at least 15 mV that is not readily reversible, for example, via flushing, dilution, filtration, and the like,” under respondents’ construction of “permanent positive charge.” CX-0006C (Dauskardt WS) at Q/A 554. Respondents’ allegation that this testing was not reliable or accurate (Resps. Br. at 82) is not supported and fails for the reasons explained above in the context of infringement. By contrast, respondents did not perform any testing of the DI Products. *See, e.g.*, Tr. 392 (Dr. Miller testifying: “Q. You didn’t -- you did not instruct any lab to perform any zeta potential testing on the accused products or the DI products, right? A. Correct.”).

Respondents argue that this limitation is not met under respondents’ construction of “wherein the colloidal silica abrasive particles have a permanent positive charge of at least 15 mV,” which incorrectly requires the only source of permanent positive charge to be internal charge, rather than charge on the surface of the particle. [REDACTED] particles have an internal nitrogen chemical species, and the permanent positive charge results at least from that, as Dr. Dauskardt measured. *See* CX-0006C (Dauskardt WS) at Q/A 559. In any event, this limitation is at least practiced under the doctrine of equivalents. For example, the differences, if any relevant differences exist, between this element as claimed in the ‘721 patent, on the one hand, and DI Products, on the other, are insubstantial. The patent describes a particle with internal nitrogen and covalently bonded aminosilane with the surface, as in the DI Products, and both practice the same function (CMP polishing) in substantially the same way (colloidal silica abrasive particles with an amount of internal nitrogen containing species and surface bonded aminosilane that leads to a requisite amount of permanent positive charge, to achieve the

same result (targeted removal rates). *See CX-0006C (Dauskardt WS) at Q/A 561.* In

fact, [REDACTED]

[REDACTED] . CX-0227C (Grumbine RWS) at Q/A 30.

**g. wherein the chemical species is not an aminosilane or a phosphonium silane.**

In the DI Products, the chemical species is [REDACTED] which is not an aminosilane or a phosphonium silane. *See CX-0006C (Dauskardt WS) at Q/A 562.* Respondents argue that this limitation is not met by the DI Products under their proposed construction, which is based on respondents' reading of this limitation as requiring that the colloidal silica abrasive particles—as opposed to the recited chemical species—contain no aminosilane and phosphonium silane. *See* *Resps. Br.* at 83. For the reasons described in the Claim Construction section above, respondents' position is incorrect.

For at least the above reasons, all of the DI Products practice claim 1.

**4. Dependent Claim 3: The composition of claim 1, further comprising a buffering agent having a pKa in a range from about 3.5 to about 5.5.**

Respondents do not dispute that the DI Products practice this claim limitation. *See* *Resps. Br.* at 80-87; *see also RX-1402C (Raghavan RWS) at Q/A 301–48.* The DI Products have a weak acid that functions as a buffering agent having a pKa in a range from about 3.5 to about 5.5. *See CX-0006C (Dauskardt WS) at Q/A 563–565; JX-0115C [REDACTED] at 12; JX-0023C (iDIEL D9228 Document) at 2;* *JX-0099C (D9228 7.5x Production Formula) at 4; JX-0104C (D9225 Control Plan) at 1;*

[REDACTED]

JX-0101C (Product Specification for D9225) at 4–5; CX-0073C (Product Specification for D9228 – 7.5X); JX-0069C ([REDACTED]) at 4. For at least the above reasons, all of the DI Products practice claim 3.

**5. Dependent Claim 4: The composition of claim 1, wherein the colloidal silica abrasive particles have a mean particle size in a range from about 30 to about 70 nm.**

Respondents do not dispute that the DI Products practice this claim limitation. *See* Resp. Br. at 80-87; *see also* RX-1402C (Raghavan RWS) at Q/A 301–48. The colloidal silica abrasive particles have a mean particle size in a range from about 30 to about 70 nm. *See, e.g.*, CX-0006C (Dauskardt WS) at Q/A 566–568; JX-0033C [REDACTED] ([REDACTED]) (showing a secondary particle size of [REDACTED] [REDACTED] using Dynamic Light Scattering); JX-0136C ([REDACTED]); JX-0109C (Certificate of Analysis Data); JX-0024C (D9228 Product Specification) at 2; JX-0091C ([REDACTED]); JX-0035C (D9228 Manufacturing data); JX-0120C (Certificate of Analysis for iDIEL D9228). For at least the above reasons, all of the DI Products practice claim 4.

**6. Dependent Claim 5: The composition of claim 1, wherein the colloidal silica abrasive particles have a mean particle size in a range from about 40 to about 60 nm.**

Respondents do not dispute that the DI Products practice this claim limitation. *See* Resp. Br. at 80-87; *see also* RX-1402C (Raghavan RWS) at Q/A 301–48. As discussed in claim 4, the colloidal silica abrasive particles have a mean particle size in a range from about 40 to about 60 nm. *See* CX-0006C (Dauskardt WS) at Q/A 569–70. For at least the above reasons, all of the DI Products practice claim 5.

[REDACTED]

7. **Dependent Claim 6: The composition of claim 1, comprising from about 0.5 to about 4 weight percent of the colloidal silica abrasive particles.**

Respondents do not dispute that the DI Products practice this claim limitation.

*See* *Resps. Br.* at 80-87; *see also RX-1402C* (Raghavan RWS) at Q/A 301–48. The DI Products include about 0.5 to about 4 weight percent of the colloidal silica abrasive particles at POU. CX-0006C (Dauskardt WS) at Q/A 571–574. Further, an advantage of the DI Products is their capability of being used at low solid content, typically containing about 2 wt% of colloidal silica abrasive particles. [REDACTED] CMP Slurry

Products include about 2 weight percent of the colloidal silica abrasive particles as made.

*See, e.g., CX-0073C* ([REDACTED]); JX-0107C ([REDACTED])

[REDACTED].

For all of the other DI Products, CMC uses and tests the products at about 2 weight percent and also instructs customers to use the DI Products at a POU of about 2 weight percent. For example, JX-0020 (CMC's website) identifies a 2% Point-of-Use for D9228. *See JX-0100C* (D9228 Document)(describing dilution ratios [REDACTED] [REDACTED]; JX-0099C [REDACTED]); CX-0074C (iDIEL™ D9225 ILD CMP Polishing Slurry); JX-0070C (iDIEL™ [REDACTED] ILD CMP Polishing Slurry); JX-0101C [REDACTED]) at 9–10; JX-0069C ([REDACTED]) at 8–9; JX-0102C ([REDACTED]) at 6; JX-0038C (D9228 Spreadsheet); JX-0048C [REDACTED] Testing); JX-0072C ([REDACTED] Testing) at 3. For at least these reasons, all DI Products at POU practice claim 6.

[REDACTED]

**8. Dependent Claim 7: The composition of claim 1, wherein 30 percent or more of the colloidal silica abrasive particles include three or more aggregated primary particles.**

Respondents do not dispute that the DI Products practice this claim limitation.

*See* Resp. Br. at 80-87; *see also* RX-1402C (Raghavan RWS) at Q/A 301–48. As described above, each DI Product includes [REDACTED] colloidal silica abrasive particles.

[REDACTED] establishes that 30 percent or more of the [REDACTED] [REDACTED] colloidal silica abrasive particles include three or more aggregated primary particles.

*See* CX-0006C (Dauskardt WS) at Q/A 575–576; JX-0077C [REDACTED] [REDACTED] ) at 7; JX-0062C [REDACTED] ) at 30. For at least the above reasons, all of the DI Products practice claim 7.

**9. Dependent Claim 8: The composition of claim 1, wherein 50 percent or more of the colloidal silica abrasive particles include three or more aggregated primary particles and 20 percent or more of the colloidal silica abrasive particles are monomers or dimers.**

Respondents do not dispute that the DI Products practice this claim limitation.

*See* Resp. Br. at 80-87; RX-1402C (Raghavan RWS) at Q/A 301–48. As described above, each DI Product includes [REDACTED] colloidal silica abrasive particles. [REDACTED]

[REDACTED] shows 50 percent or more of the colloidal silica abrasive particles include three or more aggregated primary particles and 20 percent or more of the colloidal silica abrasive particles are monomers or dimers. *See* CX-0006C (Dauskardt WS) at Q/A 577; JX-0077C [REDACTED] ) at 7; JX-0062C ( [REDACTED] ) at 30. For at least the above reasons, all of the DI Products practice claim 8.

[REDACTED]

10. **Dependent Claim 9: The composition of claim 1, wherein the colloidal silica abrasive particles include primary particles and 95 percent or more of the primary particles have a primary particle size in a range from 15 to 35 nm.**

Respondents do not dispute that the DI Products practice this claim limitation.

*See* Resp. Br. at 80-87; *see also* RX-1402C (Raghavan RWS) at Q/A 301-48. As described above, each DI Product includes [REDACTED] colloidal silica abrasive particles.

[REDACTED] shows 95 percent or more of the primary particles have a primary particle size in a range from 15 to 35 nm. *See* CX-0006C (Dauskardt WS) at Q/A 578-79; JX-0077C [REDACTED] es) at 15-16, 19; JX-0062C ([REDACTED]) at 30. For at least the above reasons, all of the DI Products practice claim 9.

11. **Dependent Claim 10: The composition of claim 1, wherein the chemical species is not ammonium.**

Respondents do not dispute that the DI Products practice this claim limitation.

*See* Resp. Br. at 80-87. For the reasons explained above, [REDACTED] particles incorporate the chemical species [REDACTED]), which is not ammonium. *See* CX-0006C (Dauskardt WS) at Q/A 580-82. For at least the above reasons, all of the DI Products practice claim 10.

12. **Dependent Claim 11: The composition of claim 1, wherein the chemical species comprises a primary amine, a secondary amine, a tertiary amine, or a quaternary amine compound.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. As described above, [REDACTED] particles incorporate the chemical species [REDACTED] which is a primary amine. *See* CX-0006C (Dauskardt WS) at Q/A 583. For at least the above reasons, all of the DI Products practice claim 11.

[REDACTED]

**13. Dependent Claim 13: The composition of claim 1, wherein the chemical species comprises from 1 to 6 carbon atoms.**

Respondents do not dispute that the DI Products practice this claim limitation.

*See* Resp. Br. at 80-87. As described above, [REDACTED] particles incorporate the chemical species [REDACTED]. *See* CX-0006C (Dauskardt WS) at Q/A 584. For at least the above reasons, all of the DI Products practice claim 13.

**14. Dependent Claim 14: The composition of claim 13, wherein the chemical species comprises ethyloxypropylamine, tetramethyl ammonium hydroxide, or ethylenediamine.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. As described above, [REDACTED] particles incorporate the chemical species [REDACTED]. *See* CX-0006C (Dauskardt WS) at Q/A 585. For at least the above reasons, all of the DI Products practice claim 14.

**15. Dependent Claim 15: The composition of claim 1, wherein the colloidal silica abrasive particles have a core-shell structure in which an outer shell is disposed over an inner core, the chemical species being incorporated in the outer shell.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. As described above, each DI Product includes the [REDACTED] colloidal silica abrasive particles. [REDACTED] have a core-shell structure in which an outer shell is disposed over an inner core, the chemical species being incorporated in the outer shell.

*See* CX-0006C (Dauskardt WS) at Q/A 586-588; JX-0062C [REDACTED] at 4; JX-0418C (Colloidal Silica Particles) at 3; JX-0134C (Understanding Key Parameters of High Oxide Rate Colloidal Silica Particles) at 3; JX-0147C (2016 CMC Email). Accordingly, all of the DI Products practice claim 15.

[REDACTED]

**16. Dependent Claim 16: The composition of claim 15, wherein the outer shell has a thickness of at least 1 nm.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. The outer shell of [REDACTED] particles has a thickness of at least 1 nm. *See* CX-0006C (Dauskardt WS) at Q/A 589. Accordingly, all of the DI Products practice claim 16.

**17. Dependent Claim 17: The composition of claim 1, having an electrical conductivity of less than about 300  $\mu$ S/cm.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. As discussed above, an advantage of the DI Products is that they are used at low solid content, typically containing about 2 wt% of colloidal silica abrasive particles. Inasmuch as charge attraction between the positively charged colloidal silica abrasive particles and the negatively charged oxide surfaces is important for the polishing performance, [REDACTED]. *See* CX-0006C (Dauskardt WS) at Q/A 591. The DI Products practice this claim at POU. *Id.* at Q/A 592–594; CX-0074C (D9225 polishing slurry); JX-0070C ([REDACTED]); JX-0101C ([REDACTED]) at 9–10; JX-0069C ([REDACTED]) at 8–9; JX-0038C (D9228 data); JX-0048C ([REDACTED]); JX-0072C ([REDACTED]); JX-0102C ([REDACTED]) at 6; CX-0024C (DTI Analysis Report) at 11. Accordingly, all DI Products at POU practice claim 17.

**18. Dependent Claim 18: The composition of claim 1, wherein the colloidal silica has a density of greater than 1.90 g/cm<sup>3</sup>.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. Testing and CMC documents shows that the density of [REDACTED]

[REDACTED]

particles is greater than 2. *See CX-0006C (Dauskardt WS) at Q/A 595–596; JX-0039C (testing data) (showing the density of the [REDACTED] particles is above 2); JX-0135C (Particle Density Results); CX-0025C (PTL Analysis Report I) at 6 (showing density of*

[REDACTED] Accordingly, all DI Products practice claim 18.

19. **Dependent Claim 19:** The composition of claim 1, wherein the colloidal silica abrasive particles have a permanent positive charge of at least 15 mV; the composition has a pH in a range from about 3.5 to about 6; the colloidal silica abrasive particles have a mean particle size in a range from about 30 to about 70 nm; and the composition includes from about 0.5 to about 4 weight percent of the colloidal silica abrasive particles.

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. For at least the reasons explained above with respect to claims 1, 4, and 6, all DI Products at POU practice claim 19. *See CX-0006C (Dauskardt WS) at Q/A 597.*

20. **Dependent Claim 20:** The composition of claim 1, wherein the colloidal silica abrasive particles have a permanent positive charge of at least 15 mV; the composition further includes a buffering agent having a pKa in a range from about 3.5 to about 5.5; the composition includes from about 0.5 to about 4 weight percent of the colloidal silica abrasive particles; the colloidal silica has a density of greater than 1.90 g/cm<sup>3</sup>; and the chemical species comprises from 1 to 6 carbon atoms.

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. For the reasons explained above with respect to claims 1, 3, 6, 13, and 18, all DI Products at POU practice claim 20. *See CX-0006C (Dauskardt WS) at Q/A 598.*

21. **Dependent Claim 21:** The composition of claim 1, wherein: the colloidal silica abrasive particles have a permanent positive charge of at least 15 mV; the composition further includes a

[REDACTED]

**buffering agent having a pKa in a range from about 3.5 to about 5.5; the composition includes from about 0.5 to about 4 weight percent of the colloidal silica abrasive particles; 30 percent or more of the colloidal silica abrasive particles include three or more aggregated primary particles; and the chemical species comprises from 1 to 6 carbon atoms.**

Respondents do not dispute that the DI Products practice this claim limitation.

*See* Resps. Br. at 80-87. For the reasons explained above with respect to claims 1, 3, 6, 7, and 13, all DI Products at POU practice claim 21. *See* CX-0006C (Dauskardt WS) at Q/A 599.

**22. Dependent Claim 23: The composition of claim 1, wherein: the colloidal silica abrasive particles have a mean particle size in a range from about 30 to about 70 nm; 30 percent or more of the colloidal silica abrasive particles include three or more aggregated primary particles; and the colloidal silica abrasive particles include primary particles and 95 percent or more of the primary particles have a primary particle size in a range from 15 to 35 nm.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resps. Br. at 80-87. For the reasons explained above with respect to claims 1, 4, 7, and 9, all DI Products practice claim 23. *See* CX-0006C (Dauskardt WS) at Q/A 600.

**23. Independent Claim 26**

**a. A chemical mechanical polishing composition comprising: a water based liquid carrier; colloidal silica abrasive particles dispersed in the liquid carrier; a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof, wherein the chemical species is a nitrogen containing compound or a phosphorus containing compound; a pH in a range from about 1.5 to about 7; wherein the colloidal silica abrasive particles have a permanent positive charge of at least 13 mV; and**

[REDACTED]

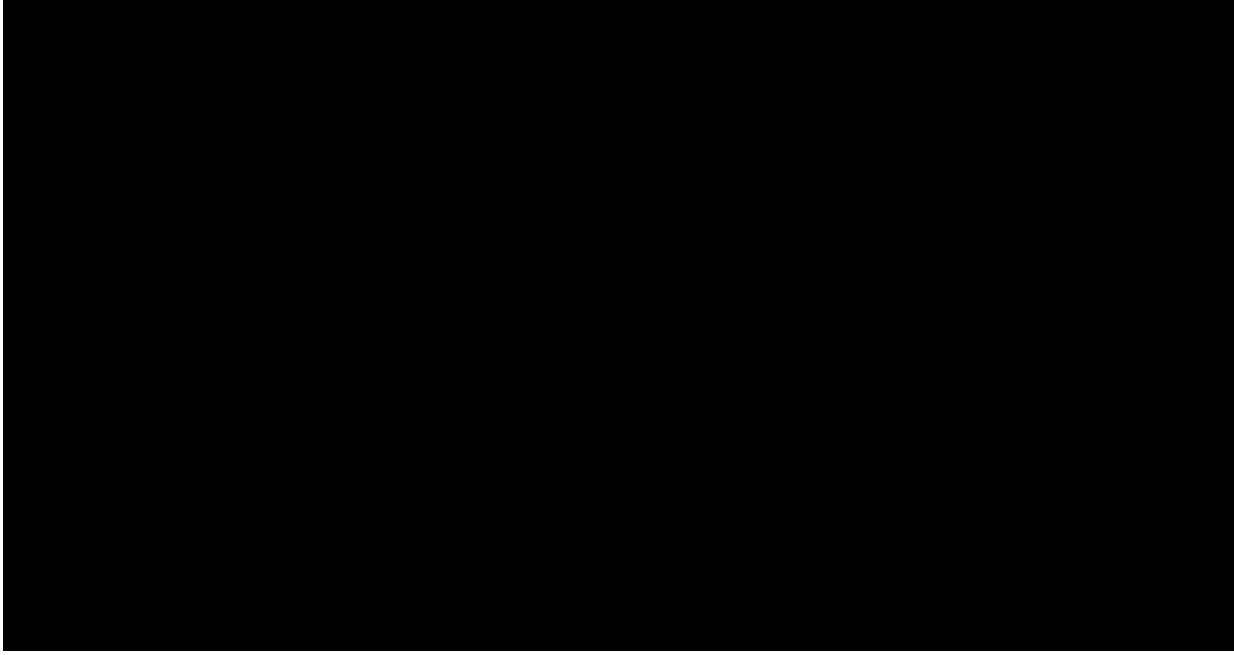
For the reasons explained above with respect to claim 1, all DI Products practice these limitations of claim 26. *See CX-0006C (Dauskardt WS) at Q/A 601–08.* As for claim 1, respondents argue that the DI products do not meet respondents’ proposed construction for the term “wherein the colloidal silica abrasive particles have a permanent positive charge of at least 13 mV.” *See* Resp. Br. at 84. Respondents are incorrect for the reasons discussed for claim 1.

**b. wherein an aminosilane compound is bonded with the outer surface of the colloidal silica abrasive particles.**

This limitation is met by each of the DI Products under any party’s proposed constructions. *See CX-0006C (Dauskardt WS) at Q/A 609–614.* As discussed above in the context of claim 1, each of the DI Products includes [REDACTED] colloidal silica abrasive particles. An aminosilane compound, [REDACTED] is bonded with the outer surface of the [REDACTED] colloidal silica abrasive particles. For example, [REDACTED] describes a [REDACTED] processes of preparing a core-shell structure, where [REDACTED]  
[REDACTED], which causes aminosilane to be incorporated throughout the shell and to bond with the outer surface of the [REDACTED] colloidal silica abrasive particles. *See, e.g., CX-0006C (Dauskardt WS) at Q/A 610; JX-0062C ([REDACTED]) at 4; JX-0142C (Particle Strategy Overview) at 4; JX-0134C (Internal CMC Document) at 3; CX-0002C (Grumbine WS) at Q/A 33–39.* The externally bonded aminosilane is depicted in CMC’s technical documents, as shown in the excerpt below from JX-0142C at 4. The lower left

portion of the graphic shows [REDACTED]

[REDACTED]



Respondents dispute that the [REDACTED] particles included externally bonded aminosilane. *See* Resp. Br. at 84-85. However, CMC's preexisting technical documents, like JX-0142C (excerpted above), show this limitation is met. Further, Dr. Dauskardt's testing of D9228 slurries, which include [REDACTED] particles, showed that

[REDACTED] *See CX-0006C*

(Dauskardt WS) at Q/A 611; CX-0023C (EAG Analysis Report) at 64. Given the

[REDACTED] of colloidal silica particles, at least some [REDACTED] molecules are bonded with the outer surface of the colloidal silica abrasive particles. CX-0006C (Dauskardt WS) at Q/A 611; *see also* CX-0010C (Guo Dep.) at 78 (“Q. So, is it fair to say that aminosilane has a strong tendency to form a covalent bond with a silica particle surface? A. If you mange direction, condition correctly, yes, most

[REDACTED]

organosilane can form a strong covalent bond.”). Furthermore, after complete removal of [REDACTED] that may be adsorbed on [REDACTED] particle surface, the NMR analysis of [REDACTED] particles (after digestion by NaOH) clearly detected [REDACTED]. At least a portion of the [REDACTED] are bonded with the outer surface of the [REDACTED] particles, given the known synthesis process. *See CX-0006C (Dauskardt WS) at Q/A 611; CX-0002C (Grumbine WS) at Q/A 33–39.*

As discussed in the Claim Construction section above, respondents’ proposed construction of this limitation requires a specific method of bonding (post-treatment). Even under this construction, this limitation is practiced under the doctrine of equivalents. The differences, if any relevant differences exist, between the process used to make [REDACTED], on the one hand, and an aminosilane post-treatment process, on the other, are insubstantial. Both resulting particles can practice the same function (CMP polishing) in substantially the same way (with an amount of covalently bound aminosilane surface treatment that prevents shielding the particle surface) to achieve the same result (targeted removal rates). *See CX-0006C (Dauskardt WS) at Q/A 615.*

For at least the above reasons, all of the DI Products practice claim 26.

**24. Claim 27: The composition claim 26, having a pH in a range from about 3.5 to about 6.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. For the reasons explained above with respect to claims 1 and 26, all DI Products practice claim 27. *See CX-0006C (Dauskardt WS) at Q/A 615.*

[REDACTED]

**25. Claim 28: The composition of claim 26, wherein the colloidal silica abrasive particles have a permanent positive charge of at least 15 mV.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. For the reasons explained above with respect to claims 1 and 26, all DI Products practice claim 28. *See* CX-0006C (Dauskardt WS) at Q/A 616.

**26. Claim 29: The composition of claim 26, wherein the colloidal silica abrasive particles have a mean particle size in a range from about 30 to about 70 nm.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. For the reasons explained above with respect to claims 1, 4 and 26, all DI Products practice claim 29. *See* CX-0006C (Dauskardt WS) at Q/A 617.

**27. Claim 31: The composition of claim 26, comprising less than [a]bout 3 weight percent of the colloidal silica abrasive particles.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. For the reasons explained above with respect to claims 1, 6, and 26, all DI Products practice claim 31. *See* CX-0006C (Dauskardt WS) at Q/A 618.

**28. Claim 32: The composition of claim 26, wherein 30 percent or more of the colloidal silica abrasive particles include three or more aggregated primary particles.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. For the reasons explained above with respect to claims 1, 7, and 26, all DI Products practice claim 32. *See* CX-0006C (Dauskardt WS) at Q/A 619.

[REDACTED]

**29. Claim 33: The composition of claim 26, wherein 50 percent or more of the colloidal silica abrasive particles include three or more aggregated primary particles and 20 percent or more of the colloidal silica abrasive particles are monomers or dimers.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. For the reasons explained above with respect to claims 1, 8 and 26, all DI Products practice claim 33. *See* CX-0006C (Dauskardt WS) at Q/A 620.

**30. Claim 34: The composition of claim 26, wherein the colloidal silica abrasive particles include primary particles and 95 percent or more of the primary particles have a primary particle size in a range from 15 to 35 nm.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. For the reasons explained above with respect to claims 1, 9, and 26, all DI Products practice claim 34. *See* CX-0006C (Dauskardt WS) at Q/A 621.

**31. Claim 35: The composition of claim 26, wherein the chemical species comprises from 1 to 6 carbon atoms.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. For the reasons explained above with respect to claims 1, 13, and 26, all DI Products practice claim 35. *See* CX-0006C (Dauskardt WS) at Q/A 622.

**32. Claim 36: The composition of claim 35, wherein the chemical species comprises ethyloxypropylamine, tetramethyl ammonium hydroxide, or ethylenediamine.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. For the reasons explained above with respect to claims 1, 14, and 26, all DI Products practice claim 36. *See* CX-0006C (Dauskardt WS) at Q/A 623.

**33. Claim 38: The polishing composition of claim 26, wherein the colloidal silica abrasive particles have a permanent positive charge of at least 15 mV; the chemical species comprises from**

[REDACTED]

**1 to 6 carbon atoms; 30 percent or more of the colloidal silica abrasive particles include three or more aggregated primary particles; and the colloidal silica abrasive particles have a mean particle size in a range from about 30 to about 70 nm.**

Respondents do not dispute that the DI Products practice this limitation. *See* Resp. Br. at 80-87. For the reasons explained above with respect to claims 1, 4, 7, 13, and 26, all DI Products practice claim 38. *See* CX-0006C (Dauskardt WS) at Q/A 624.

**34. Claim 39: A method of chemical mechanical polishing a substrate including a silicon oxygen containing material, the method comprising (a) contacting the substrate with the chemical mechanical polishing composition of claim 1; (b) moving the polishing composition relative to the substrate; and (c) abrading the substrate to remove a portion of the silicon oxygen containing material from the substrate and thereby polish the substrate.**

Respondents do not dispute that these method steps are met. *See* Resp. Br. at 80-87. These contacting, moving, and abrading steps are a routine and intended use of the DI Products for CMP of silicon oxygen materials. *See* CX-0006C (Dauskardt WS) at Q/A 626; JX-0138C (“What is Chemical Mechanical Planarization (CMP)?”); JX-0117C (Fundamentals of CMP & Slurry). The DI Products are designed to be used to polish a substrate including a silicon oxygen containing material using the claimed steps. JX-0020 (CMC Website) (advertising use with “bulk oxide applications”). Therefore, claim 39 is practiced when CMC or any of its customers uses any of the DI Products for polishing silicon oxygen materials in the United States. CX-0006C (Dauskardt WS) at Q/A 625.

For example, CMC frequently tests its products using the claimed method and achieve high removal rates. *See* CX-0006C (Dauskardt WS) at Q/A 626; JX-0079C [REDACTED] at 23; JX-0137C (D9228 Introduction) at 8; CX-

[REDACTED]  
0072C (Dielectric Product Introduction) at 7; JX-0132C (Dielectrics iDIEL D9228); JX-0131C (The New Standard of Advanced Dielectrics CMP Solution) at 15; JX-0065C

[REDACTED] at 16; JX-0133C ([REDACTED] at 14. CMC's customers also use the DI Products for polishing silicon oxygen containing material. *See* CX-0006C (Dauskardt WS) at Q/A 626; JX-0082C [REDACTED]) at 10

[REDACTED] JX-0063C [REDACTED]

[REDACTED]  
[REDACTED]

For all of the above reasons, all of the DI Products practice claim 39.

35. **Claim 40: The method of claim 39, wherein: the polishing composition comprises less than 4 percent by weight of the colloidal silica abrasive particles; and an average removal rate of the silicon oxygen material in (c) is greater than 3000 Å/min at a downforce of 5 psi or less.**

For the reasons explained for claims 6 and 39, the DI Products at POU include less than 4 weight percent of colloidal silica abrasive particles and are used for chemical mechanical polishing. The DI Products also achieve an average removal rate of silicon oxygen material greater than 3000 Angstroms per minute at a downforce of 5 psi. *See* CX-0006C (Dauskardt WS) at Q/A 630–633; JX-0137C (D9228 Introduction) at 8 (showing that the DI Products achieve a removal rate of [REDACTED] Angstroms per minute at a downforce of [REDACTED] JX-0082C

[REDACTED] at 10; JX-0081C (D9225 Preliminary Data Package) at 10 [REDACTED]  
[REDACTED]); JX-0063C [REDACTED]

[REDACTED] JX-

0133C [REDACTED] at 14.

Respondents do not dispute this evidence but argue that the term “removal rate” is indefinite and there may be circumstances where this method is not used. *See* Resps. Br. at 87. As further explained in Section IV.D.2.c (Indefiniteness), *infra*, “removal rate” is not indefinite, as it is a standard industry measurement which is routinely used. *See* CX-0006C (Dauskardt WS) at Q/A 633; CX-0229C (Dauskardt RWS) at Q/A 864–70. Further, it is immaterial whether there are circumstances where the claim method is not practiced. *Bell Commc's Research*, 55 F.3d at 622–23 (“[A]n accused product that sometimes, but not always, embodies a claimed method nonetheless infringes.”). For all of the above reasons, all DI Products at POU practice claim 40.

**36. Claim 41: The method of claim 39, wherein: the polishing composition comprises less than 2 percent by weight of the colloidal silica abrasive particles; and an average removal rate of the silicon oxygen material in (c) is greater than 3000 Å/min at a downforce of 5 psi or less.**

This claim is practiced when CMC or its customers use the DI Products in the United States. Specifically, all DI Products at POU meet each limitation of claim 41 for the reasons described with respect to claims 6, 39, and 40. *See* CX-0006C (Dauskardt WS) at Q/A 634–35.

**37. Claim 42: The method of claim 39, wherein: the polishing composition comprises less than 3 percent by weight of the colloidal silica abrasive particles; and an average removal rate of the silicon oxygen material in (c) is greater than 2000 Å/min at a downforce of 4 psi or less.**

[REDACTED]

This claim is practiced when CMC or its customers use the DI Products in the United States. Specifically, all DI Products at POU meet each limitation of claim 42 for the reasons described with respect to claims 6, 39, 40, and 41. *See CX-0006C (Dauskardt WS) at Q/A 636–37.*

**38. Claim 43: The method of claim 39, wherein: the polishing composition comprises less than 2.0 percent by weight of the colloidal silica abrasive particles; and an average removal rate of the silicon oxygen material in (c) is greater than 2000 Å/min at a downforce of 4 psi or less.**

This claim is practiced when CMC or its customers use the DI Products in the United States. Specifically, all DI Products at POU meet each limitation of claim 43 for the reasons described for claims 6, 39, 40, 41, and 42. *See CX-0006C (Dauskardt WS) at Q/A 638–39.*

**39. Claim 44: The method of claim 39, wherein: the polishing composition comprises less than 2.5 percent by weight of the colloidal silica abrasive particles; and a removal rate of the silicon oxygen material in (c) is greater than 2000 Å/min at a downforce of 4 psi or less and a removal rate of a silicon nitride material is less than 300 Å/min at a downforce of 3 psi or less.**

This claim is practiced when CMC or its customers use the DI Products in the United States. Specifically, regarding the removal rate for silicon oxygen material, the DI Products at POU meet each limitation of claim 44 for the reasons described with respect to claims 6, 39, 40, 41, 42, and 43. *See CX-0006C (Dauskardt WS) at Q/A 640.*

Further, the DI Products at POU are used to achieve a removal rate of a silicon nitride material less than 300 Å/min at a downforce of 3 psi or less. *See, e.g., CX-0006C*

(Dauskardt WS) at Q/A 641–42; JX-0079C [REDACTED]

[REDACTED]).

Accordingly, all DI Products at POU practice claim 44.

#### D. Validity of the ‘721 Patent

Respondents argue that (1) all of the asserted and DI claims are invalid under 35 U.S.C. § 112(a) for lack of enablement and written description; (2) all of the asserted and DI claims are indefinite under 35 U.S.C. § 112(b); (3) independent claims 1 and 26 lack written description and enablement support in the ‘100 Provisional Application; (4) the asserted claims and DI claims are invalid over the prior art under 35 U.S.C. § 103; (5) the ‘721 patent is invalid for improper inventorship; and (6) the ‘721 patent is unenforceable due to a pattern of active concealment and affirmative misrepresentations. *See* Resp. Br. at 87-114, 114-33, 133-47, 147-215, 215-26, 226-34.

The Staff argues that all of the asserted and DI claims are invalid under 35 U.S.C. § 112(a) for lack of enablement and written description. *See* Staff Br. at 96-132. The Staff disagrees with respondents with respect to the remaining invalidity arguments. *See* Staff Br. at 88-95, 133-44, 145-52, 153-54.

CMC disagrees with respondents with respect to all invalidity issues. *See* Compl. Br. at 112-49, 149-59, 163-190, 212-18, 218-23, 223-28. CMC disagrees with the Staff with respect to enablement and written description issues. *See* Compl. Br. at 190-211.

One cannot be held liable for practicing an invalid patent claim. *See Pandrol USA, LP v. AirBoss Railway Prods., Inc.*, 320 F.3d 1354, 1365 (Fed. Cir. 2003). Nevertheless, each claim of a patent is presumed to be valid, even if it depends from a

[REDACTED]

claim found to be invalid. 35 U.S.C. § 282; *DMI Inc. v. Deere & Co.*, 802 F.2d 421 (Fed. Cir. 1986).

A party that has raised patent invalidity as an affirmative defense must overcome the presumption by “clear and convincing” evidence of invalidity. *Checkpoint Systems, Inc. v. United States Int'l Trade Comm'n*, 54 F.3d 756, 761 (Fed. Cir. 1995).

For the reasons set forth below, it has not been shown by clear and convincing evidence that the asserted and DI claims of the ‘721 patent are invalid.

### **1. Obviousness**

Respondents argue that the asserted claims and DI claims are invalid over the prior art under 35 U.S.C. § 103. *See* Resp. Br. at 147-215. CMC and the Staff disagree. *See* Compl. Br. at 112-49; Staff Br. at 88-95.

Under section 103 of the Patent Act, a patent claim is invalid “if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.”<sup>36</sup> 35 U.S.C. § 103. While the ultimate determination of whether an invention would have been obvious is a legal conclusion, it is based on “underlying factual inquiries including: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) objective evidence of

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<sup>36</sup> The standard for determining whether a patent or publication is prior art under section 103 is the same as under 35 U.S.C. § 102, which is a legal question. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1568 (Fed. Cir. 1987).

[REDACTED]

nonobviousness.” *Eli Lilly and Co. v. Teva Pharmaceuticals USA, Inc.*, 619 F.3d 1329 (Fed. Cir. 2010).

The objective evidence, also known as “secondary considerations,” includes commercial success, long felt need, and failure of others. *Graham v. John Deere Co.*, 383 U.S. 1, 13-17 (1966); *Dystar Textilfarben GmbH v. C.H. Patrick Co.*, 464 F.3d 1356, 1361 (Fed. Cir. 2006). “[E]vidence arising out of the so-called ‘secondary considerations’ must always when present be considered en route to a determination of obviousness.” *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983). Secondary considerations, such as commercial success, will not always dislodge a determination of obviousness based on analysis of the prior art. See *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 426 (2007) (commercial success did not alter conclusion of obviousness).

“One of the ways in which a patent’s subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent’s claims.” *KSR*, 550 U.S. at 419-20. “[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.*

Specific teachings, suggestions, or motivations to combine prior art may provide helpful insights into the state of the art at the time of the alleged invention. *Id.* at 420. Nevertheless, “an obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents. The diversity of inventive pursuits and of modern technology counsels against limiting the analysis in this way.” *Id.*

[REDACTED]

“Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* A “person of ordinary skill is also a person of ordinary creativity.” *Id.* at 421.

Nevertheless, “the burden falls on the patent challenger to show by clear and convincing evidence that a person of ordinary skill in the art would have had reason to attempt to make the composition or device, or carry out the claimed process, and would have had a reasonable expectation of success in doing so.” *PharmaStem Therapeutics, Inc. v. ViaCell, Inc.*, 491 F.3d 1342, 1360 (Fed. Cir. 2007); *see KSR*, 550 U.S. at 416 (a combination of elements must do more than yield a predictable result; combining elements that work together in an unexpected and fruitful manner would not have been obvious).<sup>37</sup>

For the reasons discussed below, respondents have not shown by clear and convincing evidence that the asserted claims and DI claims are invalid over the prior art under 35 U.S.C. § 103.

#### **a. Scope and Content of the Alleged Prior Art**

As an initial matter, respondents’ obviousness arguments rely extensively on documents not within the scope and content of the prior art. For example, respondents cite confidential CMC internal documents reflecting the inventors’ own work to support their argument that the particles described in the ‘073 publication contain internal

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<sup>37</sup> Further, “when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious.” *KSR*, 550 U.S. at 416 (citing *United States v. Adams*, 383 U.S. 39, 52 (1966)).

[REDACTED]

nitrogen. *See e.g.*, RX-1076C (Raghavan WS) at Q/A 178–181, 188–191, 218–44, 578 (citing confidential CMC internal documents). None of these confidential and “internal” documents are part of the “scope and content of the prior art” upon which the obviousness analysis must be based at least because they were not available to the public. *See* 35 U.S.C. § 102(a)(1).

The specific prior art cited by respondents is discussed below.

i. **RX-0230 (WO 2009/042073) (the “‘073 Publication”)**

Respondents argue, *inter alia*:

Claims 1, 3-9, 15-19, 23-24, 26-29, 31-33, 34, 37, 39-44, and 46 of the ‘721 patent would have been obvious to a POSA based on the teachings of the ‘073 Publication (RX-0230), alone and in combination with each of Fuso colloidal silica abrasive particles BS-2H, HL-2, PL-2L, PL-3C, and [REDACTED], and the knowledge of a POSA. Also, the ‘073 Publication in combination with each of Fuso colloidal silica abrasive particles BS-2H and HL-2, and the knowledge of a POSA, render obvious claims 10-11, 13-14, 20, 21, 35, 36, and 38. A POSA would have been motivated with a reasonable expectation of success to combine the teachings of ‘073 Publication with these Fuso colloidal silica particles. RX-1076C (Raghavan WS) at QA 574. Indeed, “[i]f a property of a composition is in fact inherent, there is no question of a reasonable expectation of success in achieving it.” *Hospira*, 946 F.3d at 1332.

Resps. Br. at 159.

The ‘073 publication, a CMC patent with named inventors Dr. Grumbine, Dr. Dysard, and others, was considered by the PTO during prosecution of the ‘721 patent through CMC’s disclosure of its nearly identical U.S. counterpart, RX-0228 (U.S. Pub. 2009/0081927). Moreover, respondents cite several portions of the ‘073 publication that also appear in RX-0025 (U.S. 7,994,057) (the “‘057 patent”), a patent that was cited, discussed in detail, and distinguished in the ‘721 patent. JX-0001 (‘721 Patent) at 5:3–

[REDACTED]

10. Respondents, thus, bear a heavy burden to prove invalidity in view the ‘073 publication. *Sciele Pharma Inc. v. Lupin Ltd.*, 684 F.3d 1253, 1260–61 (Fed. Cir. 2012).

As the ‘721 patent inventors described, references like the ‘073 publication disclose CMP slurries in which “positive charge on the silica particles was achieved via treating an external surface of the particles” (JX-0001 (‘721 Patent) at 5:3–10), and not by incorporating an internal positively charged chemical species, as recited in each claim of the ‘721 patent. Respondents discredit this deficiency, as well as several others set forth below.

**[1c] and [26c] - “a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof, wherein the chemical species is a nitrogen containing compound or a phosphorus containing compound” and [1f] “wherein the chemical species is not an aminosilane or a phosphonium silane”**

Under any party’s construction, the ‘073 publication does not disclose any internal charge in the silica particles. Indeed, the reference states that “[i]f the abrasive is silica, before the abrasive is treated with the aminosilane compound, it has a zeta potential of zero at a pH of 2 to 3”—*i.e.*, no internal charge exists before external charge is added. RX-0230 (‘073 Publication) at [0023]; CX-0229C (Dauskardt RWS) at Q/A 114. As respondents’ expert Dr. Raghavan admits, the ‘721 patent’s description of “internal charge” is a “new thing” (Tr. 537, 536 (“a new statement in the patent”)) that is not expressly disclosed in the ‘073 publication (Tr. 505 (“[T]he patent does not expressly state that...”)).

Respondents argue this limitation is disclosed by: (1) the description in the ‘073 publication that silica particles “can be prepared” via a Stober process ((RX-0230 (‘073 Publication) at [0015]; *see* RX-1076C (Raghavan WS) at Q/A 284)); and (2) the ‘073

[REDACTED]

publication's listing of a broad array of commercially available products, including Fuso PL-1, PL-2, PL-3, and PL-3H particles as well as BINDZIL and Nalco particles ((RX-0230 ('073 Publication) at [0015], *see RX-1076C* (Raghavan WS) at Q/A 282, 285)).  
*See* Resp. Br. at 161-62. Dr. Raghavan opines that a POSA would "expect" one of those particles—Fuso PL particles made with the Stober process—to incorporate some amount of the nitrogen containing catalyst. Raghavan Tr. 506.

These arguments are unpersuasive for several reasons. First, Dr. Raghavan concedes that he cannot know with 100 percent certainty that there is internal nitrogen in a Stober particle without testing. *See* Raghavan Tr. 508 ("I would need to test that particle."), 642 (Stober process can be run in many ways), 507–508 (Fuso does not publish the specific manufacturing process it uses), 532–533 (he has "not read papers specifically saying the nitrogen content particles [are] made by the Stober process"). Dr. Raghavan did no such testing (Tr. 510), and his expectation that internal nitrogen is likely to be present does not establish the existence of this limitation. *Trintec Indus., Inc. v. Top-U.S.Q/A Corp.*, 295 F.3d 1292, 1295 (Fed. Cir. 2002); *see Southwire Co. v. Cerro Wire LLC*, 870 F.3d 1306, 1310 (Fed. Cir. 2017) ("[T]he use of inherency in the context of obviousness must be carefully circumscribed.").

Second, CMC's unrefuted internal "[REDACTED]" testing proves that Fuso [REDACTED] have no measurable nitrogen. *See* Dauskardt Tr. 753, 754; CX-0229C (Dauskardt RWS) at Q/A 40; CX-0227C (Grumbine RWS) at Q/A 15; CX-0230C (CMC internal spreadsheet indicating [REDACTED])  
[REDACTED] As Dr. Grumbine explained, [REDACTED]  
[REDACTED] in the particles." Grumbine Tr. 138, 139. Dr. Dauskardt further

[REDACTED]

explained that a POSA would not have expected ammonia to be inside the PL particles.

*See* Dauskardt Tr. 755.

Dr. Raghavan discredits these results, and points instead to early, confidential “Kjeldahl” testing performed by CMC that he says show [REDACTED] with internal nitrogen. *See* RX-1076C (Raghavan WS) at Q/A 241 (discussing RX-0024C), 542 (same). However, for [REDACTED], this “Kjeldahl” testing was determined at the time to be (and expressly labeled as) [REDACTED].” *See* RX-0024C (Internal spreadsheet); *see also* CDX-0008C (CX-0008C (Grumbine RWS); RX-0024C); RX-0064C (CMC internal presentation) at 11; CX-0227C (Grumbine RWS) at 15; CX-0229C (Dauskardt RWS) at Q/A 143; Tr. 751 (Dauskardt explaining Kjeldahl tests are unreliable). Kjeldahl testing also does not distinguish internal nitrogen from nitrogen bonded to the surface of the particle. *See* Tr. 513–514, 203; CX-0229C (Dauskardt RWS) at Q/A 149–152. At bottom, Dr. Raghavan cannot rely on confidential, inconclusive test results to prove this limitation is disclosed, especially when he admits that upon reviewing those results he recognized that something went wrong or was not measured properly. Raghavan Tr. 518–519, 517–518.

Third, even under respondents’ theory that Fuso or Stober particles have internal nitrogen, respondents have not shown inherency because the ‘073 publication provides numerous options other than Fuso or Stober silica, including BINDZIL and Nalco particles (neither of which Dr. Raghavan opines have internal nitrogen species). The express option in the ‘073 publication to use other particles that Dr. Raghavan has not opined have internal nitrogen demonstrates that the ‘073 publication does not

[REDACTED]

“necessarily include” the limitation. *See Transclean Corp. v. Bridgewood Servs., Inc.*, 290 F.3d 1364, 1373 (Fed. Cir. 2002).

Specific elements of the asserted and DI claims are discussed below.

**[1e] and [26e] and [28] “the colloidal silica abrasive particles have a permanent positive charge of at least [15 or 13] mV”**

It is undisputed that the ‘073 publication does not expressly disclose this limitation under any party’s construction. It does not describe any permanent positive charge values at all, including as measured in accordance with the three-step procedure at column 11 of the ‘721 patent. *See* Raghavan Tr. 539. Respondents’ expert Dr. Raghavan concedes that “permanent positive charge” is a concept that is described extensively in the ‘721 patent and, indeed, that he had “never seen the [term] permanent positive charge anywhere else. The ‘721 Patent is the first time I saw the [term] permanent positive charge, and it defines that.” *See* Raghavan Tr. 537–538, 540.

Lacking any express disclosure, respondents argue this limitation is inherently disclosed because the ‘073 publication discloses the particles are “preferably” treated with aminosilane and have a positive zeta potential. *See* Resp. Br. at 168; *See* RX-1076C (Raghavan WS) at Q/A 289. Although aminosilane may bond to the external surface of colloidal silica abrasive particles, it does not necessarily do so in all circumstances. Specifically, aminosilane can covalently bond or electrostatically associate with a silica particle surface, and the extent of covalent bonding depends on the reaction conditions. *See, e.g.*, CX-0010C (Guo Dep. Tr.) at 74, 75; CX-0229C (Dauskardt RWS) at Q/A 159; Raghavan Tr. 544 (Dr. Raghavan admitting covalent

[REDACTED]

bonding is not “inevitable or inherent” because it “depends on the assumption that the bonding is done properly”).

In the ‘073 publication, there is no description of the conditions of surface treatment or the bonding mechanism and no showing of how much of the measured zeta potential reflects a permanent positive charge versus a non-permanent positive charge. CX-0229C (Dauskardt RWS) at Q/A 156–57; CX-0228C (Dysard RWS) at Q/A 18–20. In these circumstances, Dr. Raghavan’s “hop[e]” of how the surface treatment was done in the ‘073 publication does not establish inherency. Raghavan Tr. 544–545; *Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1269 (Fed. Cir. 1991) (“Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.”).

Dr. Raghavan also cites extrinsic references regarding aminosilane bonding, including a third-party brochure and a third-party paper. RX-1076C (Raghavan WS) at Q/A 292–93 (citing RX-0194 (Shin Etsu 2012 brochure) and RX-0193 (Jankiewicz 2011)). These references also provide no guidance as to what percentage of aminosilane is covalently bonded versus electrostatically associated with the particle surface in the ‘073 publication. See CX-0229C (Dauskardt RWS) at Q/A 166.

**Dependent claims 3–5, 6, 9, 17, 19, 24, 29, 31, 34, 37, 39–44**

The ‘073 publication does not disclose any dependent claims for the reasons discussed above for independent claims 1 and 26. Several dependent claims are also not separately disclosed.

***Claim 3 – buffering agent having a pKa from about 3.5 to about 5.5.***

Respondents cite disclosure of a buffering agent with a “pKa within 1 unit of the pH of

[REDACTED]

the polishing composition,” but this does not disclose a pKa in a range of about 3.5 to about 5.5 as required by claim 3. *See CX-0229C (Dauskardt RWS) at Q/A 179.*

**Claims 4, 5, 9, 19, 29, 34 – particle size.** Claims 4, 5, 19, and 29 recite specific ranges of particle size from “about 30 to about 70” or from “about 40 to about 60,” and claims 9 and 34 require “primary particles”—*i.e.*, particles that are aggregated with other primary particles—with a size range from “15 to 35 nm.” The ‘721 patent discloses that particle aggregation and the specific claimed size ranges for primary and aggregate particles are important for achieving high removal rates for the silicon oxide applications the patent targets. *See JX-0001 (‘721 Patent) at 23:1–8, Table 4; CX-0229C (Dauskardt RWS) at Q/A 185.* Respondents argue these claims are disclosed by a single generic disclosure in the ‘073 publication of “average particle size of 10 nm to 150 nm” and extrinsic knowledge of the size of PL-1, PL-2, and PL-3 particles. *See* *Resps. Br.* at 174, 176, 179; RX-1076C (Raghavan WS) at Q/A 302, 305, 312. Such a generic description is insufficient to disclose the specific size limitations. *Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991, 999–1000 (Fed. Cir. 2006) (holding that “the disclosure of a range . . . does not constitute a specific disclosure of the endpoints of that range” with sufficient specificity to anticipate). Moreover, respondents do not cite to any disclosure related to particle aggregation. Indeed, the ‘073 publication distinguishes aggregated particles and expressly states that the colloidal silica particles of the patent are typically “non-aggregated, individually discrete particles.” RX-0230 (‘073 Publication) at [0014]; CX-0229C (Dauskardt RWS) at Q/A 557.

**Claims 6 and 31 – weight percent of silica.** These claims recite a weight percent of colloidal silica of between 0.5 and 4 weight percent or less than about 3 weight

[REDACTED]

percent—a critical feature of the ‘721 patent. *See, e.g.*, JX-0001 (‘721 Patent) at 15:9–49, 21:27–29 (“high TEOS removal rates can be achieved using polishing compositions having 3 weight percent colloidal silica abrasive particles”). Respondents argue these claims are disclosed by a general disclosure of weight percent in a wide range between 0.01 and 20. *See* Resps. Br. at 177, 194; RX-1076C (Raghavan WS) at Q/A 308. This generic description does not disclose the claimed range.

***Claims 17 – conductivity.*** Respondents argue that this claim, which recites a conductivity of “less than about 300  $\mu\text{S}/\text{cm}$ ,” is disclosed by a wide range of conductivities from 30  $\mu\text{S}/\text{cm}$  to 1500  $\mu\text{S}/\text{cm}$ . *See* Resps. Br. at 182-83; RX-1076C (Raghavan WS) at Q/A 315. Respondents cannot prove invalidity based on such a wide-ranging disclosure. The ‘721 patent describes the importance of the conductivity range to enabling a low pH, low concentration slurry at the required performance levels 7. *See e.g.*, JX-0001 (‘721 Patent) at Table 3, Table 6A, Table 6B; CX-0229C (Dauskardt RWS) at Q/A 186.

***Claim 24 – silicon nitrogen polishing accelerator.*** Respondents do not identify any disclosure in the ‘073 publication describing a silicon nitrogen polishing accelerator. *See* Resps. Br. at 187; RX-1076C (Raghavan WS) at Q/A 321–323; CX-0229C (Dauskardt RWS) at Q/A 188.

***Claim 37 – bonded with silanol group.*** Respondents argue that this claim, which requires an aminosilane compound to be bonded with “less than 4%” of silanol groups on the outer surface of the particles, is disclosed by a wide range of “surface coverage” from “2% to 50%” and a specific disclosure of surface coverage of 5%. *See* Resps. Br. at 197-98; RX-1076C (Raghavan WS) at Q/A 346. Neither discloses the claim. The ‘721 patent

[REDACTED]

describes the importance of “very low surface treatment levels” to avoid “masking” the surface of the particle. *See JX-0001* (‘721 Patent) at 7:56–62; CX-0229C (Dauskardt RWS) at Q/A 643–644. The ‘073 publication discloses the opposite, implying that a surface coverage of at least 5% is necessary for performance. *See RX-0230* (‘073 Publication) at [0085]; CX-0229C (Dauskardt RWS) at Q/A 532.

***Claims 40–44 – method claims.*** These claims recite removing “silicon oxygen containing material” at removal rates above a certain level (greater than at least 2000 Å/min) and, in claim 44, removing silicon nitride material below a certain level (less than 300 Å/min) at a certain weight percent and downforce—key features of the ‘721 patent. *See CX-0229C* (Dauskardt RWS) at Q/A 204–16; CX-0228C (Dysard RWS) at Q/A 7; *see also, e.g., JX-0001* (‘721 Patent) at 2:15–18. The ‘073 publication, on the other hand, generally discloses lower removal rates of silicon oxygen material at the required weight percent and downforce. *See e.g., RX-0230* (‘073 Publication) at Table 3 (removal rate of 1180 Angstroms/minute at 1 weight percent); CX-0229C (Dauskardt RWS) at Q/A 205.

Disregarding these disclosures, for claims 40 and 41 and 44, respondents instead cite to generic portions of the ‘073 publication describing removal rates of “200 Å/min to 5000 Å/min” for silicon oxide, removal rates of “100 Å/min to 3000 Å/min” for silicon nitride, and a separate disclosure of a downforce of 4 psi. *See* Resp. Br. at 201, 205; RX-1076C (Raghavan WS) at Q/A 360–61, 374. For claims 42, 43, 44, respondents cite examples 1 and 7, but these examples do not disclose the elements arranged as required by the claim, for at least the reason that Example 1 of the ‘073 publication does not specify the zeta potential of the compositions. Neither Example 1 nor Example 7 disclose the permanent positive charge of the compositions or the composition of claim 1,

[REDACTED]

and there is no disclosure of a “downforce of 3 psi or less” as required by claim 44. *See CX-0229C* (Dauskardt RWS) at Q/A 215.

**ii. Whether the Silica Particles Are Prior Art**

Respondents rely on different silica particles—BS-2H, PL-2L, PL-3C, [REDACTED] and HL-2<sup>38</sup>—as secondary references which they argue were on sale or in public use before the effective filing date based solely on CMC’s purported use and purchase of those particles. *See* Resps. Br. at 154-55; RX-1076C (Raghavan WS) Q/A 161, 214.

To be prior art, respondents must show by clear and convincing evidence that each of these particles was “subject of a commercial offer for sale” (e.g., “commercially exploited,” that these particles were not experimental uses; and that the particles were “ready for patenting.”). *See, e.g., Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 67 (1998) (holding that the on-sale bar applies only when “the product [was] the subject of a commercial offer for sale” and “the invention [was] ready for patenting”); *Quest Integrity USA, LLC v. Cokebusters USA Inc.*, 924 F.3d 1220, 1227 (Fed. Cir. 2019) (“The on-sale bar seeks to prevent [a]ny attempt to use [the claimed invention] for a profit, and not by way of experiment, for more than one year before filing for a patent application.”) (internal citation omitted). Samples that were “sold for testing and evaluation purposes only, were subject to confidentiality agreements, and could not be resold to third parties” do not qualify as prior art. *Certain Magnetic Data Storage Tapes and Cartridges*

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<sup>38</sup> CMC states that “[r]espondents notified CMC the night before this post-hearing brief was due that it no longer intends to pursue obviousness arguments involving HL-3 or [REDACTED]” Compl. Br. at 121 n.31.

[REDACTED]

*Containing the Same*, No. 337-TA-1076, Comm'n Op. at 50 (June 20, 2019). Under this standard, none of the BS-2H, PL-3C, [REDACTED] and HL-2 particles are prior art.

First, as set forth below on a particle-by-particle basis, each of the BS-2H, PL-3C, [REDACTED], and HL-2 particles was [REDACTED]  
[REDACTED]. There is no evidence to the contrary. The single “brochure” respondents cite (RX-0231) has no known origin, no confirmed date of distribution, nor any indication of pricing or other indicia of a commercial sale. *See CX-0229C* (Dauskardt RWS) at Q/A 381–388; *Grp. One, Ltd. v. Hallmark Cards, Inc.*, 254 F.3d 1041, 1047 (Fed. Cir. 2001); *see also Pfaff*, 525 U.S. at 64.

Second, CMC’s [REDACTED] was subject to strict confidentiality requirements at all times. *See CX-0229C* (Dauskardt RWS) at Q/A 397; CX-0002C (Grumbine WS) at Q/A 54; CX-0268C (Confidentiality Agreement between Cabot and [REDACTED]); *see also JX-111C* [REDACTED] (defining confidentiality obligations for [REDACTED]); CX-0249C (First Amended and Restated Supply Agreement between Cabot and [REDACTED]) (defining confidentiality obligations for supply agreement). Such confidentiality supports the samples’ [REDACTED]  
[REDACTED] *See, e.g., Barry*, 914 F.3d at 1327 (“[A]n accessibility determination may be rejected where the evidence establishes a sufficient obligation of confidentiality.”). Accordingly, even if some [REDACTED], respondents have not shown that the [REDACTED]  
[REDACTED] BS-2H, PL-3C, [REDACTED], or HL-2 particles are prior art.

[REDACTED]

**BS-2H particles.** BS-2H particles were [REDACTED] at all times before June 25, 2014. Fuso's confidential [REDACTED]

[REDACTED]

[REDACTED]" See JX-0080C (Fuso, dated May 13, 2015) at 20281; *see also* CX-0218C (Fuso Presentation dated May 25, 2012) at 92053.

BS-2H [REDACTED]

[REDACTED]. *See* CX-0227C (Grumbine RWS) at Q/A 21; CX-0229C (Dauskardt RWS) at Q/A 410; CX-0257C (Email from Craig Zedwick to Colin Aschmidt) (CMC reporting to Fuso that [REDACTED])

[REDACTED]; CX-0257C (Email from Craig Zedwick to Colin Aschmidt) (Fuso asking CMC to [REDACTED])

CX-0254C (Particle Size Study and Factory Comparison) (evaluation [REDACTED] [REDACTED]). Consistent with the strict confidentiality discussed above, all materials were confidential. *See* CX-0229C (Dauskardt RWS) at Q/A 419.

Contrary to respondents' arguments, neither the [REDACTED] establish any commercial sale. *See* JX-0111C ([REDACTED]) RX-0110C (Agreement) (describing [REDACTED]); CX-0227C (Grumbine RWS) at Q/A 21 [REDACTED]

Any [REDACTED] did not reflect commercial marketing or commercial value. Rather, the amount of [REDACTED]. *See* CX-0229C (Dauskardt RWS) at Q/A 398, 410.; CX-0013C (Kozhukh Dep. Tr.) at 42–43. Moreover, the [REDACTED] respondents point to as an alleged sale was subject to [REDACTED]

[REDACTED]. See RX-0032C (spreadsheet) (Respondents cite [REDACTED]); CX-0257C (Email from Craig Zedwick to Colin Aschmid) (describing [REDACTED]  
[REDACTED].

**PL-3C particles.** PL-3C particles were [REDACTED]  
[REDACTED] at all times before June 25, 2014. Fuso's [REDACTED]  
[REDACTED]  
[REDACTED]" See JX-0080C (Fuso, dated May 13, 2015) at 20281; *see also* CX-0218C (Fuso Presentation dated May 25, 2012) at 92063 (PL-3C [REDACTED]). PL-3C also [REDACTED]

[REDACTED] See CX-0227C (Grumbine RWS) at Q/A 18; CX-0229C (Dauskardt RWS) at Q/A 434–435; JX-0130C (May 31, 2013, J. Dysard email) at 11–12 (describing CMC feedback). After [REDACTED] the PL-3C particle in any [REDACTED]. See CX-0227C (Grumbine RWS) at Q/A 19; RX-0677C (Dysard Dep. Tr.) at 215–216. Consistent with the strict confidentiality discussed above, all materials were confidential. See CX-0229C (Dauskardt RWS) at Q/A 439.

Contrary to respondents' arguments, no provision of the [REDACTED]  
[REDACTED] established any commercial sale. See JX-0111C  
[REDACTED] at 3–4. Nor does the citation of "PL-3C" in a non-prior art patent reflect commercialization, as Dr. Raghavan opines. See RX-1076C (Raghavan WS) at Q/A 211. Any [REDACTED] did not reflect commercial marketing or commercial value. Rather, the amount of the [REDACTED]

[REDACTED]. See CX-0229C (Dauskardt RWS) at Q/A 434, 439; CX-0013C (Kozhukh Dep. Tr.) at 42–43.

[REDACTED] **particles.** [REDACTED] particles were experimental and provided solely for testing and evaluation at all times before June 25, 2014. Fuso's [REDACTED]

[REDACTED]  
[REDACTED] See JX-0080C (Fuso, dated May 13, 2015) at 20281; *see also* CX-0218C (Fuso Presentation dated May 25, 2012) at 92063 (does not even include [REDACTED]).

[REDACTED] also evolved significantly over the course of [REDACTED]  
[REDACTED]. CX-0227C (Grumbine RWS) at Q/A 18; CX-0229C (Dauskardt RWS) at Q/A 449, 454; RX-0677C (Dysard Dep. Tr.) at 215–216 (CMC was [REDACTED] CX-0269C (Email from Glenn Whitener to Toyosaki Kazuyuki) (Fuso requests “[REDACTED”); CX-0253C (Email from Tamara Vincer to Justin Stewart) (testing); CX-0252C (Email from Kazuyuki Toyosaki to Seto Takahiro) (testing); CX-0250C (New Particle Performance Update) at 2. Consistent with the strict confidentiality discussed above, all materials were kept confidential. CX-0229C (Dauskardt RWS) at Q/A 450, 457.

Contrary to respondents' arguments, neither the [REDACTED]  
[REDACTED] establish any commercial sale of these particles. See JX-0111C [REDACTED] at 3–4; RX-0110C (Agreement) (describing [REDACTED]); RX-0677C (Dysard Dep. Tr.) at 249–250; CX-0227C (Grumbine RWS) at Q/A 18 [REDACTED]  
[REDACTED]. Any [REDACTED] by CMC did not reflect commercial marketing or commercial

[REDACTED]  
value. The amount of [REDACTED]. *See CX-0229C* (Dauskardt RWS) at Q/A 450; CX-0013C (Kozhukh Dep. Tr.) at 42–43.

Moreover, the [REDACTED] respondents point to as an alleged sale was subject to [REDACTED]. RX-0032C (spreadsheet) (Respondents cite [REDACTED] lot). Indeed, [REDACTED] was produced by [REDACTED] [REDACTED] *See CX-0270C* (Email from Kiminobu Akatsuka to Craig Zedwick). Contrary to respondents' arguments, before June 25, 2014, CMC used the [REDACTED] consistent with standard industry practices and not for any commercial purpose. *See CX-0227C* (Grumbine RWS) at Q/A 18; RX-0059C (Confidential email) (describing testing of ' [REDACTED] ); CX-0271C ([REDACTED]); CX-0013C (Kozhukh Dep. Tr.) at 101, 103.

***HL-2 particles.*** HL-2 particles were [REDACTED] at all times before June 25, 2014. Fuso's [REDACTED] [REDACTED] *See JX-0080C* (Fuso, dated May 13, 2015) at 20281; *see also CX-0218C* (Fuso Presentation dated May 25, 2012) at 92053; CX-0227C (Grumbine RWS) at Q/A 23. HL-2 also [REDACTED]. *See CX-0227C* (Grumbine RWS) at Q/A 23; CX-0229C (Dauskardt RWS) at Q/A 476. After [REDACTED] in any commercial product. *See JX-0130C* (Dysard Ex. 6) at 29 [REDACTED] Consistent with the strict confidentiality agreement, all materials were confidential. *See CX-0229C* (Dauskardt RWS) at Q/A 475.

[REDACTED]

As discussed, contrary to respondents' arguments, the [REDACTED] does not establish any commercial sale. *See JX-0111C* [REDACTED] at 3–4. Any [REDACTED] did not reflect commercial marketing or commercial value. Rather, the amount of the [REDACTED] . *See CX-0229C* (Dauskardt RWS) at Q/A 472; *CX-0013C* (Kozhukh Dep. Tr.) at 42–43. Respondents also do not establish that any HL particles are prior art [REDACTED]. Indeed, [REDACTED] further confirms the [REDACTED] and shows that [REDACTED] *See CX-0019C* (Van der Velden Dep. Tr.) at 26–27 [REDACTED]  
[REDACTED]  
[REDACTED]; *JX-0339C* (Additive investigation, dated September 30, 2014) [REDACTED]  
[REDACTED]

**b. Motivation to Combine the '073 Publication with the Silica Particle Secondary References**

Respondents make at least five different obviousness combinations, combining CMC prior patent reference ('073 publication) with any of at least five different asserted silica particles (BS-2H, HL-2, PL-2L, PL-3C, and [REDACTED]). For the alleged motivation to combine for each of these combinations, respondents rely on the same generic analysis—alleging, for example, that there would have been a reason to combine the '073 publication with any member of the group of silica particles because the silica particles are all “suitable for CMP applications.” *See RX-1076C* (Raghavan WS) Q/A 568, Q/A 571. Simply alleging that the '073 publication could have been combined with any of the

[REDACTED]

silica particles because they “were directed to the same art or same techniques” does not “articulate a sufficient motivation to combine.” *See, e.g., Microsoft Corp. v. Enfish, LLC*, 662 F. App’x 981, 990 (Fed. Cir. 2016). *See CX-0229C* (Dauskardt RWS) at Q/A 483–549. “Such short-cut logic would lead to the conclusion that any and all combinations of elements known in this broad field would automatically be obvious, without the need for any further analysis.” *Securus Techs., Inc. v. Glob. Tel\*Link Corp.*, 701 F. App’x 971, 977 (Fed. Cir. 2017).

### i. The ‘073 Publication and the Particles

Respondents’ argument is unpersuasive in view of the disparate nature of the particles and ‘073 publication reference. For example, there is no dispute that the five silica particles are non-analogous to the particles disclosed in the ‘073 publication or each other and have very different features—varying in size, shape, morphology, zeta potential, and isoelectric point, among other things. *See CX-0229C* (Dauskardt RWS) at Q/A 21, 557; RX-1076C (Raghavan WS) at Q/A 572. Respondents’ position based on swapping out the particles disclosed in ‘073 publication with any of the five disparate particles—without any teaching of whether or how it would work—is far from routine, as Dr. Raghavan opines. *See CX-0229C* (Dauskardt RWS) at Q/A 483–549.

This is particularly true inasmuch as four of the five particles relied on by respondents (BS-2H, HL-2, PL-3C, and [REDACTED]) are identified as [REDACTED]  
[REDACTED] *See JX-0080C* (Fuso, dated May 13, 2015) at 20281; *see also CX-0218C* (Fuso Presentation dated May 25, 2012) at 92063 (does not even include [REDACTED]); *CX-0229C* (Dauskardt RWS) at Q/A 333–36, 391–93, 409–10, 433, 448–49, 454–56, 471–72. These [REDACTED] particles

had unique and unknown characteristics and features. As Fuso disclosed, at that time, HL-2 and BS-2H had [REDACTED]” and the PL-3C and [REDACTED]

[REDACTED] See JX-0080C (Fuso, dated May 13, 2015) at 20281. [REDACTED]

[REDACTED]. See JX-0339C (Testing data spreadsheet) (investigating [REDACTED] CX-0010C

(Guo Dep. Tr.) at 133–135; *see also* JX-0040C (Fuso Advanced Abrasive Testing Status) at 3843 (asking “[REDACTED] In January 2013, CMC similarly asks “[REDACTED]

” See JX-0083C (Slurry Technology Development Highlights) at 2.

There were several drawbacks with these particles, including that they had diminished performance in the very conditions disclosed in the ‘073 publication. *See* CX-0229C (Dauskardt RWS) at Q/A 555–58. For example, for HL particles, [REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED] See RX-0189C (Slurry Quarterly Update Presentation) at RX-0189C.000015; JX-0040C (Fuso Advanced

Abrasive Testing Status) at 3843 ([REDACTED])

[REDACTED] 3845; CX-0227C (Grumbine RWS) at Q/A 23 [REDACTED]

[REDACTED]  
Regarding PL-3C and [REDACTED] particles, they had a [REDACTED] the opposite of what ‘073 publication was trying to accomplish. *See* RX-0066C

(Synthesis and Characterizations Presentation) at CMC00017450; CX-0227C (Grumbine RWS) at Q/A 18 [REDACTED]

JX-0419C (Shen Dep. Tr.) at 256 [REDACTED]

[REDACTED] Similarly, for BS-2H particles, CMC found that it could [REDACTED]

[REDACTED] *See JX-0040C (Fuso Advanced Abrasive Testing Status) at 3845; JX-0067C (iDIEL Colloidal ILD Project Part 1) at 17462–64; CX-0227C (Grumbine RWS) at Q/A 21 [REDACTED]*

[REDACTED]  
Yet, rather than analyzing the specifics of the slurry of the ‘073 publication and whether it would work with the disparate characteristics of the five particles, Dr. Raghavan provides no analysis as to why there would be a reasonable expectation of success in making any of these combinations. *See RX-1076C (Raghavan WS) Q/A 566–73; CX-0229C (Dauskardt RWS) at 563.* As discussed below in more detail, this is not sufficient. *See CX-0229C (Dauskardt RWS) at Q/A 612; CX-0229C (Dauskardt RWS) at Q/A 483–549.*

## **ii. Respondents’ Specific Arguments**

First, respondents argue that a POSA would combine any of the five silica particles with the ‘073 publication because each particle is “consistent with the type of particles” in the ‘073 publication. *See RX-1076C (Raghavan WS) Q/A 567.* That disregards the disclosures of the documents and the characteristics of the particles. The particles identified in the ‘073 publication are “typically are non-aggregated individually discrete particles, which generally are spherical or nearly spherical in shape . . . .” *See*

RX-0230 ('073 Publication) at [0014]. The BS-2H, PL-3C, [REDACTED], and HL- 2 particles, on the other hand, are [REDACTED]. JX-0080C (Fuso, dated May 13, 2015) at 20282. Particle size and morphology are “[REDACTED] [REDACTED]. *Id.* at 20291. A POSA would not have been motivated to try to use an [REDACTED] with a composition that was intended to be used with non-aggregated particles, or expect it to succeed. *See CX-0229C (Dauskardt RWS) at Q/A 557.*

More fundamentally, respondents do not explain why a POSA would have used any of the BS-2H, HL-2, PL-2L, PL-3C, and [REDACTED] particles in the specific CMP slurry of the '073 publication when the '073 publication already identifies other commercially available, appropriate silica particles (PL-1, PL-2, PL-3, Nalco, and BINDZIL particles). *See RX-0230 ('073 Publication) at [0014].* Respondents have not even established that a POSA would have even known about the five other particles. *See e.g., CX-0268C*

([REDACTED]) [REDACTED] JX-0353C, -0354C, -0355C, -0356C, -345C (Agreements) [REDACTED] The only non-confidential document regarding some of particles cited by respondents is a purported brochure with no known origin or date of distribution and only limited description of the particles. *See RX-1076C (Raghavan WS) at Q/A 570–71.*

Second, respondents argue that a POSA “would have been further motivated with a reasonable expectation of success...to use colloidal silica particles containing a nitrogen containing compound internal to an outer surface thereof.” RX-1076C (Raghavan WS) Q/A 569. No one—not even Fuso—[REDACTED]

[REDACTED]. See Section IV.D.5 (Inventorship), *infra*; see also CX-0229C (Dauskardt RWS) at Q/A 505–11. Fuso was [REDACTED]. Fuso “[REDACTED]” [REDACTED]” Tr. 120. Indeed, Dr.

Raghavan concedes that he has “not read papers specifically saying the nitrogen content [of] particles made by the Stober process” and that he is not sure “whether anybody bothered” to measure it because “there are many other applications for colloidal silica and a little bit of nitrogen in the particle may not bother them.” Raghavan Tr. 532–533.

Indeed, [REDACTED]

[REDACTED]. See JX-0339C (Additive Investigation in [REDACTED] Slurry) at 4 (“[REDACTED]

Nor do respondents attempt to show, through testing or otherwise, the existence of an internal chemical species in any of the BS-2H, HL-2, PL-3C, [REDACTED], or PL-2L particles [REDACTED], or that the versions of the particles existing before the ‘721 patent included such a species. Raghavan Tr. 510 (Dr. Raghavan saying “I did not do any … testing to prove that” any of these 5 Fuso particles actually contained internal nitrogen). Rather, Dr. Raghavan appears to opine that such an internal chemical species would be inherent. “[T]he use of inherency in the context of obviousness must be carefully circumscribed.” *Southwire*, 870 F.3d at 1310 (internal citations omitted). Dr. Raghavan’s opinion, that “[t]o [his] knowledge, the art did not teach any routine methods for avoiding the incorporation of some residual nitrogen

[REDACTED]

catalyst,” is ineffective. *See RX-1076C* (Raghavan WS) at Q/A 542; *see also Honeywell Int’l Inc. v. Mexichem Amanco Holding S.A. DE C.V.*, 865 F.3d 1348, 1356 (Fed. Cir. 2017) (finding analogous “reverse reasoning” to be insufficient to sustain the PTAB’s rejection of a claim).

In any event, the ‘073 publication expressly teaches away from using particles with internal charge. As discussed above, the colloidal silica particles of the ‘073 publication “have a zeta potential of zero” before surface treatment. *See RX-0230* (‘073 Publication) at [0023]. The ‘073 publication discloses that increasing external surface treatment is desirable and effective at increasing removal rates. *See RX-0230* (‘073 Publication) at [0085]; CX-0229C (Dauskardt RWS) at Q/A 532. There would be no reason that a POSA would turn to any mechanism other than surface charge in implementing the slurries of these references. *See CX-0229C* (Dauskardt RWS) at Q/A 534; *see also id.* at Q/A 484–495, 512–513, 541–544; JX-0252C (Slurry Research Summary). Indeed, respondents’ expert Dr. Raghavan conceded that “if the surface coverage is high,” as it is in the ‘073 publication, then “the internal nitrogen should not make a big difference.” Raghavan Tr. 533, 535 (“So you really do not need to worry about, at that point, role played by internal nitrogen, because we are dealing with surface groups.”).

Further, despite arguing that a POSA would have known about and would have been motivated to use, silica particles containing internal nitrogen in general, Dr. Raghavan also admitted that during his decades of academic experience, industry experience, research, and teaching directly on the issues presented in this investigation, he has “never” talked about internal charge of silica particles with anyone or mentioned

[REDACTED]

internal charge in any of his 183 published papers. *See* Raghavan Tr. 493–494, 494–495, 525, 526–527 (“[I]n my years of teaching in colloid chemistry, I have never talked about internal charge.”), Raghavan Tr. 529.

Third, respondents argue that a POSA “would therefore have been motivated with a reasonable expectation of success to use such surface modified silica particles with a more positive zeta potential.” *See* Resps. Br. at 168-69; RX-1076C (Raghavan WS) Q/A 570, 587. The ‘073 publication already discloses zeta potentials of over 40 mV, and respondents provide no reason why a POSA would consider a higher zeta potential to be desirable with the asserted silica particles, which had unique morphologies and features that would have been unfamiliar to a POSA. *See* CX-0229C (Dauskardt RWS) at Q/A 553. Moreover, at least PL-3C and [REDACTED] particles had preexisting aminosilane on their external surface, and respondents do not address whether a POSA would have had an expectation of success that adding more surface treatment to these particles, as disclosed in the ‘073 publication, would have even worked. *See* CX-0229C (Dauskardt RWS) at Q/A 570; *see also id.* at Q/A 496–504 (no general motivation to increase zeta potential).

Nothing else in the state of the art or other generic motivations to combine that respondents raise change this analysis. *See* CX-0229C (Dauskardt RWS) at Q/A 359–74; 483–549. Indeed, respondents’ identification of the “state of the art” is a list of references that provide no additional guidance, including (1) references from disparate technical fields that do not relate to CMP and would not have been considered for CMP ((e.g., RX-0201 (Wu), RX-0198 (Blaaderen), RX-0209 (Xiao), and RX-0223 (‘136 publication) (alkaline solution with negative zeta potential and reduced colloidal stability in a substrate wafer polisher not CMP), RX-0211 (Ottenbrite); *see also* CX-0229C

(Dauskardt RWS) at Q/A 361–74, 511)); and (2) references relating to known ineffective surface treatment ((e.g., RX-0214 (Soto-Cantu), RX-0194 (Shin Etsu), RX-0209 (Xiao), RX-0216 ('974 Patent); *see also* CX-0229C (Dauskardt RWS) at Q/A 375–80, 496–504, 514–23)).

**c. Combination of '073 Publication with any one of the PL-2L, PL-3C, [REDACTED], BS-2H, and HL-2 Particles**

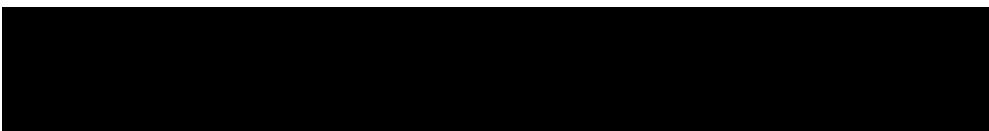
The '073 publication does not render the asserted or DI claims obvious alone, for the same reasons discussed above. As discussed below, each resulting combination of the '073 publication with any one of the PL-2L, PL-3C, [REDACTED], BS-2H, and HL-2 particles, does not disclose the limitations missing from the '073 publication.

**i. '073 Publication and PL-2L**

As discussed below, respondents have not shown that there would have been a motivation to combine PL-2L and the '073 publication. PL-2L particles in combination with the '073 publication do not render claims 1, 4–9, 15–19, 24, 26–29, 31, 32–34, 37, 39–44, and 46 obvious. PL-2L particles do not disclose numerous claim limitations.

**[1c], [26c] – Particle Species Limitations**

Respondents do not meet their burden to show that the particles have a nitrogen or phosphorous containing compound “internal to an outer surface” of the particle. As discussed above, no PL particles (including PL-2L, PL-3C, or [REDACTED]) satisfy this limitation; nor does the '073 publication. *See* Tr. 753, 754; CX-0229C (Dauskardt RWS) at Q/A 40; CX-0227C (Grumbine RWS) at Q/A 15; CX-0230C (CMC internal spreadsheet indicating “[REDACTED]”). Respondents provide no basis for why this limitation would have been obvious.



**[1d] and [27] - “a pH in a range from about 3.5 to about 6”**

The identified particles do not disclose this limitation because each are provided at a pH of [REDACTED]. *See* JX-0080C (Fuso, dated May 13, 2015) at 20282. Contrary to respondents’ arguments, it would not have been a matter of routine optimization to arrive at the claimed pH. *See* CX-0229C (Dauskardt RWS) at Q/A 524–29, 628, 638.

**[1e] and [26e] and [28] “the colloidal silica abrasive particles have a permanent positive charge of at least [15 or 13] mV”**

None of the asserted particles satisfy this limitation. It is undisputed that the particles as provided by Fuso have a pH of [REDACTED] and, correspondingly, a permanent positive charge of [REDACTED]. *See* JX-0080C (Fuso, dated May 13, 2015) at 20282, 20296; CX-0229C (Dauskardt RWS) at Q/A 631. Nor does Dr. Raghavan show that the combination of the ‘073 publication with any of the listed particles—or even modifying the pH of the particles—would have disclosed this limitation. Respondents’ experts have not tested permanent positive charge for any particles. *See* CX-0229C (Dauskardt RWS) at Q/A 633–35.

**Claims 4, 5, 7, 8, 9, 29, 32, 33, 34 – particle size, aggregation**

Dr. Raghavan does not provide evidence that at least BS-2H, HL-2, and PL-2L satisfy claim 4, or that BS-2H, HL-2, PL-2L, and PL-3C satisfy claim 5, or that any of the particles satisfy claim 7, 8, or 9. *See* Resps. Br. at 175, 179; RX-1076C (Raghavan WS) Q/A 601–07; 617–19; CX-0229C (Dauskardt RWS) at Q/A 637. Moreover, Dr. Raghavan does not provide any explanation why a POSA would have selected a particular particle size or aggregation. Instead, respondents just seem to argue that any particle size or aggregation would have been obvious because it was known that particle

[REDACTED]

size or aggregation could have changed. Modifying particle size and aggregation would not have been “routine optimization.” *See CX-0229C* (Dauskardt RWS) at Q/A 536–37, 645.

**Claims 3, 6, 17, 24, and 31**

Regarding claim 3 (buffering agent), claims 6 and 31 (weight percent), claim 17 (conductivity), and claim 24 (silicon nitrogen polishing accelerator), Dr. Raghavan’s opinion that a POSA would simply have been motivated to arrive at these claims based on the knowledge of the art is not supported. *See CX-0229C* (Dauskardt RWS) at Q/A 538–40, 602. Indeed, respondents’ R&D documents indicate [REDACTED]

[REDACTED] *See CX-0261C* (Development of a TEOS Removal Rate Model) at 15071

[REDACTED]

[REDACTED]

**Claim 18 – “particle density”**

Respondents evidence of particle density is not prior art and appears conflicting. *Compare JX-0080C* (Fuso, dated May 13, 2015) at 20284 (2015 document describing approximate densities) with 20285 (different density results). This is consistent with [REDACTED]. Modifying a fundamental property such as density, without guidance, would also entail more than “routine optimization” as respondents argue. *See RX-1076C* (Raghavan WS) Q/A 646; *CX-0229C* (Dauskardt RWS) at Q/A 607.

**Claims 15 and 16 – core shell particle structure**

Regarding claims 15 and 16, respondents do not argue that any of the BS-2H, HL-2, or PL-2L particles have a core shell structure. *See* *Resps. Br.* at 181–82. Dr. Raghavan

[REDACTED]

instead opines that the limitations of claims 15 and 16 would be within the knowledge of a POSA “generally.” *See RX-1076C* (Raghavan WS) Q/A 633–37. Dr. Raghavan cites a series of non-CMP references and does not explain why such references are “generally” related to the knowledge of a POSA. For example, Nakajo is not relevant to the disclosures of the ‘073 publication because it relates to polishing a semiconductor wafer, not chemical mechanical polishing applications. Moreover, Dr. Raghavan cites disclosures in other non-CMP material relating to surface treatment of silica. *Id.* (citing Soto- Cantu, RX-0198 (van Blaaderen), Graf, RX-0204 (Kalele)). These references do not disclose the limitations of claims 15 and 16, and a POSA would not have been motivated to combine such disclosures with the ‘073 publication. *See CX-0229C* (Dauskardt RWS) at Q/A 603.

### **Claim 19**

Claim 19 recites a combination of limitations in other claims. For the reasons discussed with respect to those limitations, claims 19 would not have been obvious.

### **Claim 37 – bonded silanol groups**

Regarding claim 37, respondents argue that it would have been routine optimization to arrive at this limitation. *See* Resp. Br. at 197-98. By arguing that larger zeta potential is always a motivator, respondents appear to argue that a POSA would have increased the amount of aminosilane—not decreased it. *See* Resp. Br. at 197-98; CX-0229C (Dauskardt RWS) at Q/A 530–35, 610. The ‘073 publication implies that a surface coverage of at least 5% is necessary for performance. *See RX-0230* (‘073 Publication) at [0085]; CX-0229C (Dauskardt RWS) at Q/A 532.

[REDACTED]

Respondents also point to confidential [REDACTED] to support his opinion that it would have been obvious to modify any of the given particles to bond aminosilane to less than 4% of particle surface silanol groups. *See* Resps. Br. at 198; RX-1076C (Raghavan WS) at Q/A 698. Dr. Raghavan's conclusion is based on an [REDACTED]  
[REDACTED]. *See* CX-0229C (Dauskardt RWS) at Q/A 609; JX-0419C (Shen Dep. Tr.) at 215 ("This is just our conjecture [sic]. So this is our – just our guess.").

**Claim 39–44, and 46 – method claims**

Respondents do not argue that the asserted particles fill the gaps on the '073 publication related to these claims. *See* Resps. Br. at 201. Instead, Dr. Raghavan opines that the limitations would have been obvious because of routine optimization. *See* RX-1076C (Raghavan WS) at Q/A 709. There is no evidence, however, demonstrating that achieving the recited removal rate of either silicon oxygen or silicon nitride material at the recited particle level would have been obvious or a POSA would have had a reasonable expectation of success. *See* CX-0229C (Dauskardt RWS) at Q/A 358, 545–49.

Regarding claim 46, Dr. Raghavan opines that use of a silicon nitride polishing inhibitor to achieve the claimed polishing rate selectivity would have been obvious from the disclosure of an "amino acid" in the '073 publication. *See* RX-1076C (Raghavan WS) Q/A 728. Dr. Raghavan did not provide an explanation of why the specific rate selectivity would have been obvious to achieve using the claimed polishing composition or that achieving this selectivity in the field of CMP would have been a matter of routine optimization. *See* CX-0229C (Dauskardt RWS) at Q/A 614.

[REDACTED]

**ii. ‘073 Publication and PL-3C**

Respondents have not shown that there would have been a motivation to combine PL-3C and the ‘073 publication for the reasons discussed above. For the same reasons discussed above for PL-2L, PL-3C in combination with the ‘073 publication does not render claims 1, 3–8, 17, 19, 24, 26–29, 31, 32, 37, 39–44, and 46 obvious, and PL-3C particles do not disclose numerous claim limitations. Moreover, as discussed above, the evidence indicates that PL-3C was [REDACTED] and not prior art, and respondents have not proven the structure or features of the particles at that time. *See* Section IV.D.1.a.ii (Whether the Silica Particles Are Prior Art), *supra*.

**iii. ‘073 Publication and [REDACTED]**

Respondents have not shown that there would have been a motivation to combine [REDACTED] and the ‘073 publication for the reasons discussed above. For the same reasons discussed above for PL-2L, [REDACTED] in combination with the ‘073 publication does not render claims 1, 3–8, 17, 19, 24, 26–29, 31, 32, 37, 39–44, and 46 obvious, and PL-3C particles do not disclose numerous claim limitations. Moreover, as discussed above, the evidence indicates that [REDACTED] and not prior art, and respondents have not proven the structure or features of the particles at that time. *See* Section IV.D.1.a.ii, *supra*.

**iv. ‘073 Publication and BS-2H**

Respondents have not shown that there would have been a motivation to combine BS-2H and the ‘073 publication for the reasons discussed above. For the same reasons discussed above for PL-2L, BS-2H in combination with the ‘073 publication does not render claims 1, 3–9, 10–11, 13–21, 24, 26–29, 31, 32, 33–44, and 46 obvious, and BS-

[REDACTED]

2H particles do not disclose numerous claim limitations. Moreover, as discussed above, the evidence indicates that BS-2H was [REDACTED] and not prior art, and respondents have not proven the structure or features of the particles at that time. *See CX-0229C (Dauskardt RWS) at Q/A 575, 585; Section IV.D.1.a.ii, supra.*

For example, for the particle species limitations, regarding BS-2H or HL-2 particles, Dr. Raghavan appears to rely solely on theoretical speculation regarding the Stober process and the same [REDACTED]. At least for HL particles, Dr. Raghavan could not confirm these were Stober process particles. *See Raghavan Tr. 510.* Moreover, as discussed above, respondents have not shown the confidential CMC [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] *See CX-0227C (Grumbine RWS) at 15; CX-0229C (Dauskardt RWS) at Q/A 143; Tr. 751 (Dauskardt explaining Kjeldahl tests are unreliable); CX-0229C (Dauskardt RWS) at Q/A 149–52.* For the same reasons, respondents have not shown that the recited particles disclose claim 10, 11, 13, 14, 35, 36. Claim 20 recites a combination of limitations in other claims. Claim 20 is not obvious for reasons discussed with respect to those limitations. Claim 38 recites a combination of limitations in other claims. The combination in claim 38 is also not obvious for the reasons discussed with respect to those limitations.

v.       **‘073 Publication and HL-2**

Respondents have not shown that there would have been a motivation to combine HL-2 and the ‘073 publication for the reasons discussed above. For the same reasons discussed above for PL-2L and BS-2H, HL-2 in combination with the ‘073 publication

[REDACTED]

does not render claims 1, 3–9, 10–11, 13–21, 24, 26–29, 31, 32, 33–44, and 46 obvious, and HL-2 particles do not disclose numerous claim limitations. Moreover, as discussed above, the evidence indicates that HL-2 was [REDACTED] and not prior art, and respondents have not proven the structure or features of the particles at that time. *See CX-0229C* (Dauskardt RWS) at Q/A 575, 585.

**d. Secondary Considerations**

The objective evidence, also known as “secondary considerations,” includes commercial success, long felt need, and failure of others. *Graham v. John Deere Co.*, 383 U.S. 1, 13–17 (1966); *Dystar Textilfarben GmbH v. C.H. Patrick Co.*, 464 F.3d 1356, 1361 (Fed. Cir. 2006). “[E]vidence arising out of the so-called ‘secondary considerations’ must always when present be considered en route to a determination of obviousness.” *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983). Secondary considerations, such as commercial success, will not always dislodge a determination of obviousness based on analysis of the prior art. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 426 (2007) (commercial success did not alter conclusion of obviousness).

As discussed in detail above, respondents have not established a *prima facie* case of obviousness. Even if such a case existed, however, for the reasons discussed below, objective evidence weighs against a finding of obviousness. Indeed, these objective indicia “can be the most probative evidence … to avert the trap of hindsight.” *Crocs, Inc. v. Int'l Trade Comm'n*, 598 F.3d 1294, 1310 (Fed. Cir. 2010).



**i. Nexus Between the ‘721 Patent and the DI Products**

Respondents argue CMC has failed to establish that the undeniable objective indicia are “commensurate in scope with the claims.” *See* Resp. Br. at 209–10. The evidence, including internal and external documents as well as corroborated testimony, shows the contrary. First, as discussed above, CMC’s DI Products are covered by the DI claims. *See* CX-0006C (Dauskardt WS) at Q/A 516–671. The claimed features of the ‘721 patent—an acidic slurry with silica particles having a positively charged internal chemical species—provide the DI Products with benefits, such as better cost and defectivity. *See* CX-0006C (Dauskardt WS) at Q/A 516–671, 643–71; CX-0002C (Grumbine WS) at Q/A 28–33.

Second, CMC’s witnesses provided uncontested testimony that the DI Products are coextensive with the patented invention. For example, Dr. Woodland’s confirmed that the success of D922x was the “direct result” of the inventors “innovating a solution to a long-standing problem in the industry.” *See* CX-0001C (Woodland WS) at Q/A 28, 48; JX-0067C (Internal CMC Presentation) at 4; Tr. 85–87. Indeed, the D922x products were able to meet an industry need of using a “fundamentally different removal mechanism,” and had a “specifically designed positively charged particle” in an acidic CMP slurry which resulted in “increased particle use efficiency” and a “much lower concentration of colloidal silica abrasive particles. *See* CX-0001C (Woodland WS) at Q/A 31. Similarly, Dr. Grumbine testified that the D922x slurries are “acidic CMP slurries with silica particles having a positively charged internal chemical species” that

[REDACTED]

“embody” and “use” the invention for the ‘721 patent. *See CX-0002C* (Grumbine WS) at Q/A 28; Tr. 129–140.

Third, respondents argue that any purported objective indicia are not tied to the claimed “permanent positive charge” because CMC allegedly does not market permanent positive charge. *See* *Resps. Br.* at 211. Yet, substantial evidence shows that the D922x products were marketed to customers as having a “proprietary, ultra-pure colloidal silica particle with precisely engineered surface chemistry” and a “positive charge” which “enable efficient use of particle.” *See e.g.*, *JX-0028C* (D922x marketing material) (“Switch to D922x and see the positive difference”); *JX-0029C* (D9228 marketing material) (“ultra-pure colloidal silica particles with precisely engineered surface chemistry”); *JX-0030C* (D9228 marketing material) (“Positive charge enables efficient use of particle”).

Lastly, respondents’ reliance on *Fox Factory, Inc. v. Sram, LLC*, 944 F.3d 1366 (Fed. Cir. 2019) is misplaced. *See* *Resps. Br.* at 211. Respondents argue that the DI Products are not afforded a presumption of nexus to the objective indicia because CMC’s DI Products allegedly embody the claims of other CMC patents. However, here, unlike in *Fox Factory*, CMC does not argue that other CMC patents share the same objective indicia as the ‘721 patent. Indeed, the evidence shows that CMC’s objective indicia are attributable to the claimed features of the ‘721 patent, including the acidic, cationic colloidal silica- based slurries that allow customers to achieve desired removal rates at low silica concentrations— not just the aminosilane compound being internally incorporated in the colloidal silica particles as respondents argue. Accordingly, a nexus exists where the product is coextensive with the patent. *Fox Factory*, 944 F.3d at 1375.

[REDACTED]

**ii. Long Felt Need and Failure of Others**

As discussed, there was a long felt need in the industry for the invention of the ‘721 patent. *See* JX-0001 (‘721 Patent) at 1:65–2:11; CX-0001C (Woodland WS) at Q/A 30; CX-0002C (Grumbine WS) at Q/A 53; CX-0004C (Dysard WS) at Q/A 19–20; CX-0006C (Dauskardt WS) at Q/A 646. “[L]ongfelt need is closely related to the failure of others” as it demonstrates a demand and a failure to satisfy that demand. *In re Cyclobenzaprine Hydrochloride*, 676 F.3d at 1082–1083.

Respondents argue that there was no long-felt need in the industry because the prior art “‘057 patent and ‘073 Publication” allegedly taught acidic slurries with “reduced silica concentrations.” *See* Resp. Br. at 212. However, the ‘057 patent and ‘073 publication, as discussed above, were failed attempts at cationic surface treatments. *See* CX-0228C (Dysard RWS) at Q/A 5–6; JX-0083C (CMC Internal Presentation) at 21864 (Technology LRM); CX-0004C (Dysard WS) at Q/A 20. As Dr. Dysard testified, the ‘057 patent was not effective and had the “exact opposite” intent as the ‘721 Patent.” *See* CX-0228C (Dysard RWS) at Q/A 8–10.

Dr. Dysard’s testimony is corroborated by documents from that time indicating that attaching a positive charge to the external surface of a particle did not work because the external cationic chemistry “acts as glue” and “increases scratch[es].” *See e.g.*, JX-0083C (CMC Internal Presentation) at 21864. Thus, these earlier attempts did not solve the need in the industry for a “low solids” CMP slurry with positively charged particles for dielectric applications “with better cost and defectivity.” *See* JX-0067C (CMC Presentation) at 4; JX-0001 (‘721 Patent) at 1:65–2:11; CX-0001C (Woodland WS) at

[REDACTED]

Q/A 30; CX-0002C (Grumbine WS) at Q/A 53; CX-0004C (Dysard WS) at Q/A 19–20; CX-0006C (Dauskardt WS) at Q/A 646.

Further, CMC’s competitors, [REDACTED], also failed in this regard. *See* CX-0001C (Woodland WS) at Q/A 30; JX-0067C (CMC Presentation) at 4; CX-0002C (Grumbine WS) at Q/A 53; CX-0004C (Dysard WS) at Q/A 19–20; CX-0006C (Dauskardt WS) at Q/A 646. Respondents do not dispute that [REDACTED]  
[REDACTED]. *See* *Resps. Br.* at 213; RX-1402C (Dauskardt RWS) at Q/A 368; JX-0252C (Slurry research) at 17; JX-0210C (Status Review); JX-0170C [REDACTED]  
[REDACTED]  
[REDACTED]. *See* CX-0006C (Dauskardt WS) at Q/A 28; CX-0010C (Guo Dep) at 29, 30, 32, 33. The long-felt need, coupled with the failure of others further illustrates the non-obviousness of the asserted claims. *See In re Piasecki*, 745 F.2d 1468, 1475 (Fed. Cir. 1984).

### **iii. Unexpected Results, Skepticism, Industry Praise**

The inventors’ testimony, which is corroborated by internal and external CMC documents, shows that they unexpectedly realized that “positively charged colloidal silica abrasive particles for dielectric applications may alternatively be obtained via incorporating certain positively charged chemical species into the abrasive particles (i.e., incorporating the chemical species sub-surface in the interior of the particles).” JX-0001 (‘721 Patent) at 5:21–26. Indeed, prior to the ‘721 patent, no one in the industry was considering using an internal charge. *See* CX-0004C (Dysard WS) at Q/A 20; CX-0006C

[REDACTED]

(Dauskardt WS) at Q/A 654. It was Dr. Dysard's experience in a different industry that led him to realize imparting internal charge was the solution. *See CX-0004C* (Dysard WS) at Q/A 25; *see, e.g.*, JX-0036C (CMC Presentation).

Given the previous failures to achieve these results, initial skepticism was tied to the invention of the '721 patent. Dr. Woodland testified that customers such as [REDACTED]

[REDACTED] had "appropriate skepticism about whether this product would actually work." *See CX-0001C* (Woodland WS) at Q/A 35; JX-0143C (Internal CMC Document). Specifically, JX-0143C shows the significant number of tests that [REDACTED] required before considering using the DI Products. *See JX-0143C* (Internal CMC Document); JX-0145C (CMC Email Regarding [REDACTED] Testing).

This skepticism led to praise when customers realized what CMC had invented. For example, Hynix considered this slurry to be ground-breaking and to revolutionize the market. *See CX-0001C* (Woodland WS) at Q/A 32. Hynix performed extensive tests and found very positive results, including "excellent" performance reducing scratch defects—a key issue for advanced node semiconductors. *See CX-0001C* (Woodland WS) at Q/A 40–44; JX-0148C (Semicon Presentation). Dr. Grumbine also describes that the announcement of the DI Products and their superior performance was met with intense interest. *See CX-0002C* (Grumbine WS) at Q/A 43.

#### iv. Commercial Success

The DI Products have been commercially successful. *See, e.g.*, JX-0052C (Global D922x Revenue & Volume); CX-0001C (Woodland WS) at Q/A 46, 48; JX-0076C (Project Coyote, Progress Update and Lessons Learned) at CMC00018736; JX-0112C (Dielectrics Overview, FY19); JX-0113C (Dielectrics Overview, FY18); CX-0005C

(Vander Veen WS) at Q/A 128; CX-0019C (Van der Velden Dep. Tr.) at 185.

Respondents argue that CMC failed to consider “[REDACTED]  
[REDACTED], or cannibalization.”<sup>39</sup> *See* Resp. Br. at 213-14.

The DI Products enjoy commercial success because they embody the innovative features of the ‘721 patent, including being acidic, cationic colloidal silica-based slurries that allow customers to achieve desired removal rates at low silica concentrations. As discussed above, there was a need for dielectric slurries that could outperform traditional offerings and achieve the same removal rates and planarization performance, and much lower solids. *See* CX-0001C (Woodland WS) at Q/A 48. The DI Products, practicing the features of the asserted claims, met this need and as a result disrupted the market. *See id.*

As Dr. Grumbine testified, if the D922x family did not use a silica particle including internal nitrogen-containing chemical species, it would not be able to achieve the performance levels that it does. *See* CX-0002C (Grumbine WS) at Q/A 44. The internal nitrogen- containing chemical species allows the particle to maintain a high charge without saturating the surface of the silica with external treatments. *See* CX-0002C (Grumbine WS) at Q/A 44. Thus, the success of the D922x family has been a direct result of CMC’s invention. *See id.* at Q/A 28–29.

#### v. Copying

Respondents argue that “evidence of copying requires more than identifying a competing product.” *See* Resp. Br. at 215.

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<sup>39</sup> Regardless of whether Dr. Vander Veen analyzed advertising data (Tr. 269–271), the sales numbers of the D922x products (which embody the ‘721 patent) show the commercial success of these products. *See, e.g.*, JX-0052C (Global D922x Revenue); CX-0001C (Woodland WS) at Q/A 46; CX-0019C (Van der Velden Dep. Tr.) at 185.

[REDACTED]

Respondents argue:

CMC ignores years of DuPont's development of acidic cationic CMP slurries for silicon oxide removal before DuPont became aware of the '721 patent. RX-1402C (Raghavan Reb. WS) at QA 415. CMC also disregards the impact its [REDACTED]

[REDACTED] Id. CMC wrongly argues that DuPont supposedly "came to recognize the benefits of internal charge." CX-0006C (Dauskardt WS) at QA 670. DuPont [REDACTED]

[REDACTED] as taught by the prior art. RX-1402C (Raghavan Reb. WS) at QA 416. Thus, to the extent CMC argues that DuPont copied the benefits of the '721 patent, CMC simply confirms that its claims encompass subject matter unpatentable to CMC over the prior art.

Resps. Br. at 215.

The evidence shows that respondents had access to CMC's patent at least by

[REDACTED], and knew CMC's patented features as early as [REDACTED] through [REDACTED] [REDACTED]. See JX-0405C (Respondents' Discovery Response) at page 63; *see CX-0008C* (Chu Dep. Tr.) at 198–199, 203; JX-0321C (CMC presentation in Respondents' files); JX-0320C (CMC presentation in Respondents' files). Respondents' witnesses admit that [REDACTED] "from CMC patents reciting permanent positive charge [REDACTED]. See CX-0013C (Kozhukh Dep. Tr.) at 69.

Moreover, it appears that after learning of the '721 patent (which includes a description of a BS particle from Fuso), [REDACTED] [REDACTED] *See JX-0178C* (Technical Review-Development of Advanced Acidic ILD Slurry). After learning of the '721 patent, respondents began marketing the benefits of a particle with [REDACTED]." *See JX-0212C* (Optiplane 2300 Poster Presentation). Further, one month after learning of CMC's

[REDACTED]

patent, a patent application filed by Rohm and Haas Electronic Materials CMP Holdings, Inc. included similar language as paragraphs from the application that led to the ‘721 patent. *Compare* JX-0417 (US 10,557,060) 7:26–36 with JX-0001 (721 Patent) at 11:4–3; *see also* CX-0006C (Dauskardt WS) at Q/A 154; CDX- 0006C.007 (citing same); CX-0050 (Comparison of CMC and DuPont Patents).

Respondents argue that they had already developed “acidic cationic CMP slurries for silicon oxide removal before DuPont became aware of the ‘721 patent.” *See* Resp. Br. at 215; RX-1402C (Raghavan RWS) at Q/A 415. However, the evidence shows that any development that respondents had prior to the ‘721 patent did not work and was abandoned. *See* CX-0006C (Dauskardt WS) at Q/a 668-70; JX-0339C (Additive Investigation). *See* CX-0008C (Chu Dep. Tr.) at 191; CX-0007C (Auger Dep. Tr.) at 130–131, 132, 136; JX-0170C [REDACTED] Additionally, the evidence shows that respondents’ internal documents discussed the [REDACTED] created by CMC’s patents. *See* JX-181C (DuPont Presentation); CX-0006C (Dauskardt WS) at Q/A 503.

Nonetheless, while there is some circumstantial evidence that suggests the possibility of copying, the administrative law judge is not persuaded that the record evidence establishes copying by respondents.

\* \* \*

Accordingly, for the reasons discussed above, objective evidence weighs against a finding of obviousness.

## 2. Indefiniteness

Respondents argue that all of the asserted and DI claims are indefinite under 35 U.S.C. § 112(b). *See* Resp. Br. at 114-33.

CMC and the Staff disagree. *See* Compl. Br. at 149-59; Staff Br. at 133-44.

The definiteness requirement of 35 U.S.C. § 112 ensures that the patent claims particularly point out and distinctly claim the subject matter that the patentee regards to be the invention. *See* 35 U.S.C. § 112, ¶ 2; *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354, 1366 (Fed. Cir. 2004). If a claim's legal scope is not clear enough so that a person of ordinary skill in the art could determine whether or not a particular product infringes, the claim is indefinite, and is, therefore, invalid. *Geneva Pharm., Inc. v. GlaxoSmithKline PLC*, 349 F.3d 1373, 1384 (Fed. Cir. 2003).<sup>40</sup>

Thus, it has been found that:

When a proposed construction requires that an artisan make a separate infringement determination for every set of circumstances in which the composition may be used, and when such determinations are likely to result in differing outcomes (sometimes infringing and sometimes not), that construction is likely to be indefinite.

*Halliburton Energy Servs. v. M-I LLC*, 514 F.3d 1244, 1255 (Fed. Cir. 2008).

The Supreme Court addressed the issue of indefiniteness, and stated that a finding of indefiniteness should not be found if the claims, “viewed in light of the specification and prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus*, 572 U.S. at 910.

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<sup>40</sup> Indefiniteness is a question of law. *IGT v. Bally Gaming Int'l, Inc.*, 659 F.3d 1109 (Fed. Cir. 2011).

[REDACTED]

The burden is on the accused infringer to come forward with clear and convincing evidence to prove invalidity. *See Young*, 492 F.3d at 1344 (“A determination that a patent claim is invalid for failing to meet the definiteness requirement in 35 U.S.C. § 112, ¶ 2 is a legal question reviewed de novo.”).

For the reasons discussed below, respondents have not shown by clear and convincing evidence that all of the asserted and DI claims are indefinite under 35 U.S.C. § 112(b).

**a. “A permanent positive charge of at least [13 or 15] mV”**

Respondents argue that the term “a permanent positive charge of at least [13 or 15] mV” is indefinite based on the testimony of their expert Dr. Miller that the permanent positive charge depends on zeta potential measurements and “measured zeta potential . . . depends on how the measurement is conducted and can vary substantially.” *See RX-1075C* (Miller WS) at Q/A 25. The evidence does not support this conclusion. The procedures outlined in the specification and the knowledge of a POSA provide reasonable certainty regarding the scope of the claims.

First, a claim requiring a measurement satisfies the *Nautilus* standard when the patent “identifies the applicable methods of measurement and demonstrates their application via examples.” *Guangdong Alison Hi-Tech Co. v. Int'l Trade Comm'n*, 936 F.3d 1353, 1362–63 (Fed. Cir. 2019). This is true even in the case where “there was no industry standard.” *Presidio Components, Inc. v. Am. Tech. Ceramics Corp.*, 875 F.3d 1369, 1376 (Fed. Cir. 2017) (citing *Ethicon Endo-Surgery, Inc. v. Covidien, Inc.*, 796 F.3d 1312, 1316 (Fed. Cir. 2015)).

[REDACTED]

The inventors of the ‘721 patent provide the very guidance the Federal Circuit has deemed sufficient. The patent provides specific and detailed guidance for measuring permanent positive charge, which Dr. Miller neither describes nor challenges in his witness statement. *See JX-0001* (‘721 Patent) at 11:14–31 (describing detailed protocols for measuring permanent positive charge), 11:32–61 (explaining the underlying scientific principles for the permanent positive measurement), Example 10 (demonstrating the measurement and meaning of permanent positive charge through a working example); *see also RX-1075C* (Miller WS) at Q/A 27–29.

The ‘721 patent also gives explicit guidance on the commercially-available instrument to use to make the zeta potential measurements, and uses such an instrument in each of the patent examples. *Id.* at 10:54–58 (“The zeta potential of a dispersion such as a polishing composition may be obtained using the Model DT-1202 Acoustic and Electro-acoustic spectrometer available from Dispersion Technologies, Inc. (Bedford Hills, N.Y.”), 19:31–38 (“In these examples, reported zeta potentials values were measured using the Model DT-1202 Acoustic and Electro-acoustic spectrometer (available from Dispersion Technologies)...”); Tr. 377–379 (Dr. Miller admitting these points and conceding that the DT-102 instrument is a reasonable choice for measuring zeta potential). This explicit guidance alone defeats respondents’ arguments.

*Guangdong*, 936 F.3d at 1362–63; *see also Ethicon Endo-Surgery*, 796 F.3d at 1316.

Second, even if that guidance were not given, “[u]nder [the Federal Circuit’s] post-*Nautilus* cases, a claim is not indefinite if a person of skill in the art would know how to utilize a standard measurement method . . . to make the necessary measurement.” *Presidio Components*, 875 F.3d at 1376. The evidence establishes that zeta potential is a

[REDACTED]

standard parameter frequently measured in the CMP industry. For example, one of respondents' experts has described zeta potential as an "an easily measured property of a nanomaterial, and has been proposed as an essential nanomaterial property for reporting in scientific publications and regulatory registration of new nanomaterials." *See RX-1024* (Lowry publication) at 1; *see also*, Tr. 372 (Dr. Miller admits that a POSA would understand what zeta potential means), 372 (Dr. Miller admitting that in 2014, zeta potential was a common parameter measured across several industries, including the CMP industry); RX-1076C (Raghavan WS) at Q81–82, 101, 103, 106, 153 (relying numerous references that disclose zeta potential measurement data).

Similarly, numerous current and former employees of respondents specifically testified that [REDACTED]

[REDACTED]." CX-0012C (Jacobs Dep. Tr.) at 30–31; *see also* CX-0016C (Penta Dep. Tr.) at 73 (testifying that he [REDACTED]

[REDACTED] CX-0007C (Auger Dep. Tr.) at 26 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] CX-0010C (Guo Dep. Tr.) at 151 (clarifying [REDACTED]

[REDACTED].

The inventor of the DT-1202 instrument, Dr. Dukhin, testified similarly, as did CMC's expert, Dr. Dauskardt. *See JX-0420C* (Dukhin Dep. Tr.) at 234–236 ("Q: Is zeta potential a well-known parameter in colloidal science? A: It's known for about 150 years. Q: Can zeta potential be accurately measured by standard instruments? A: Yes.");

[REDACTED]

CX-0229C (Dauskardt RWS) at Q/A 813 (“zeta potential is such a well-established parameter that a [POSA] would have no trouble understanding the term with reasonable certainty.”). Former employee and inventor Dr. Shen testified that he personally analyzed the embodiment examples using the DT-1202 instrument, JX-0419C (Shen Dep. Tr.) at 37-38, and confirmed “[DT-1202] is a very standard measurement equipment for zeta potential” and “everybody pretty much can operate on this instrument and get very repeatable results at CMC.” *Id.* at 39.<sup>41</sup>

Measuring zeta potential is a well-known and well-documented procedure and respondents’ arguments that permanent positive charge is indefinite are incorrect.

### i. **“reasonable certainty”**

The Supreme Court has recognized that “absolute precision is unattainable” in patent disclosure and as a result “the certainty which the law requires in patents is not greater than is reasonable, having regard to their subject-matter.” *Nautilus*, 572 U.S. at 910 (citation omitted). To support respondents’ indefiniteness position, Dr. Miller characterizes the standard zeta potential parameter as “not directly measurable” and limits its use to only qualitative applications. Dr. Miller (respondents’ expert with respect to zeta potential (RX-1075C (Miller WS) at Q/A 8-10)) testified that it is “not []

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<sup>41</sup> Indeed, many of respondents’ patents include claims that recite zeta potential ranges. See, e.g., CX-0229C (Dauskardt RWS) at Q/A 826–832; CDX-0007C.024 (RX-0902 (U.S. Patent No. 10,037,889); CX-0241 (U.S. Patent No. 10,119,048); CX-0266 (U.S. Patent Publication No. 20190185713); CX-0243 (U.S. Patent Publication No. 2018/0094166); JX-0016 (U.S. Patent No. 10,508,221); CX-0262 (U.S. Patent No. 10,584,265); JX-0119 (U.S. Patent No. 10,464,188)); *see also* CX-0010C (Guo Dep. Tr.) at 59 (confirming use of zeta potential in their patent applications). Measuring zeta potential is a well-known and well-documented procedure and respondents’ arguments that permanent positive charge is indefinite are incorrect.

[REDACTED]

in all practicality” possible to obtain a reliable quantitative value for zeta potential, Miller Tr. 403–404, and “any patent claim in a CMP patent that recites a zeta potential range is necessarily invalid.” Miller Tr. 385. Dr. Miller’s opinion directly contradicts the testimony of other experts in this investigation, his own reliance on zeta potential data where it suits his positions, and the standard practice in the CMP industry. *See, e.g.*, CX-0229C (Dauskardt RWS) at Q/A 813-20; Tr. 354–355 (Dr. Lowry agrees that it is possible to obtain a reliable quantitative value for zeta potential); RX-1076C (Raghavan WS) at Q/A 81–82, 101, 103, 106, 153 (relying on zeta potential values for comparison); RX-1401 (Miller RWS) at Q/A 75–77, 218–19 (relying on zeta potential values from various documents for comparison with the zeta potential values measured by Dr. Dauskardt); Miller Tr. 373 (Dr. Miller admits that he “didn’t investigate standard practices in the CMP industry regarding zeta potential”); CX-0229C (Dauskardt RWS) at Q/A 821–32 (testifying on the standard practices of the use of zeta potential in the CMP industry).

Respondents’ and Dr. Miller’s insistence on absolute certainty is not supported by law and cannot render a standard parameter such as zeta potential indefinite. *See, e.g.*, *Sonix Tech. Co. v. Publ’ns Int’l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017) (“a patentee need not define his invention with mathematical precision in order to comply with the definiteness requirement.”); *Koninklijke Philips N.V. v. Zoll Med. Corp.*, 656 F. App’x 504, 526 (Fed. Cir. 2016).

[REDACTED]

**ii. Existence of different zeta potential measurement instruments**

Disregarding the clear guidance of the specification regarding use of the DT-1202 instrument for measuring zeta potential, Dr. Miller opines that “it was well known that measured zeta potential values can vary significantly from instrument to instrument.” *See RX-1075C* (Miller WS) at Q/A 27. Dr. Miller has not provided evidence of such variability. Dr. Dauskardt<sup>42</sup> directed rigorous testing of the Accused Products by two independent labs with two different instruments including the DT-1202 instrument disclosed in the ‘721 patent as well as the alternative Malvern instrument that Dr. Miller testified is more appropriate. *See CX-0006C* (Dauskardt WS) at Q/A 257–304; RX-1401C (Miller RWS) at Q/A 131. Those measurements show excellent agreement between the two instruments. *See CX-0229C* (Dauskardt RWS) at Q/A 843; CDX-0006C.0031 (*CX-0026C* (PTL Analysis Report II) at 3–5; CX-0024C (DTI Analysis Report) at 11).

Dr. Miller, by contrast, relies on select data outliers of different types of samples under analysis conditions not pertinent to the claims at issue—and measurements taken on products other than the Accused Products and DI Products at issue in this investigation. *See CX-0229C* (Dauskardt RWS) at Q/A 840; *see also* Tr. 681–682. Dr. Miller also relies upon zeta potential data that was admittedly inaccurate. *See RX-1075C* (Miller WS) at Q/A 143–46; CX-229C (Dauskardt RWS) at Q/A 840–42; Tr. 347 (Dr.

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<sup>42</sup> Dr. Dauskardt has used “zeta potential extensively,” is very familiar with CMP technology, oversaw zeta potential testing in this investigation, provided his own independent assessment regarding the indefiniteness of the permanent positive charge term in both his expert report and his witness statement, and testified extensively on this matter in deposition and at the evidentiary hearing. *See, e.g.,* Tr. 658, 665, 749–751.

[REDACTED]

Lowry testified that the purpose of his protocol “was not to measure zeta potential accurately”), 315–317 (Dr. Lowry concedes that he is not familiar with the instrument and did not oversee the testing), 317–319 (Dr. Lowry admits that the conductivity measurement discrepancies “had variance of—of almost an order of magnitude” and he did not know “the accuracy of any of the zeta potential values”), 320 (Dr. Lowry concedes that “the calculation would be affected by [the assumed density] value”), 374–375 (Dr. Miller concedes that he provided no input to the testing).

In short, respondents at best demonstrate a mere “possibility” of different results. That is insufficient to render a claim indefinite. *See Takeda Pharm. Co. Ltd. v. Zydus Pharm. USA, Inc.*, 743 F.3d 1359 at 1366–67 (Fed. Cir. 2014) (“[W]e do not believe that the mere possibility of different results from different measurement techniques renders claim [] indefinite.”); *see also Osram GmbH v. Int'l Trade Comm'n*, 505 F.3d 1351, 1357 (Fed. Cir. 2007) (“When there is more than one method of measurement and the patent does not explicitly discuss the methods, persons experienced in the field are reasonably deemed to select the method that better measures the parameters relevant to the invention.”).

**iii. Alleged ambiguity regarding the calculation method for zeta potential of a CMP slurry**

Dr. Miller also opines that zeta potential renders the permanent positive charge term indefinite because “the ‘721 Patent does not indicate what calculation theory should be used to calculate the zeta potential”—a classical (“Smoluchowski-type”) theory or an “advanced” theory. *See RX-1075C* (Miller WS) at Q/A 111, 178. Dr. Miller’s opinion is

[REDACTED]

hypothetical and unsupported by the facts. *See CX-0229C* (Dauskardt RWS) at Q/A 845–50.

While Dr. Miller acknowledges “an elementary [Smoluchowski] theory would be appropriate in many of the situations,” he opines “[f]or the CMP slurries described by the ‘721 Patent, it is unclear if an elementary theory or an advanced theory would be the most appropriate.” *See RX-1075C* (Miller WS) at Q/A 165–69. Even as Dr. Miller conceded that he had never “had any prior experience at all with CMP,” Miller Tr. 370–371, Dr. Miller did not investigate and disregarded the standard practice of the CMP industry. *See Tr. 373, see also Tr. 658* (Dr. Dauskardt testifying that “measuring the zeta potential with the normal well-accepted quantitative methods that are widely, widely used in industry would be the quantitative metric that should be used.”).

Furthermore, Dr. Dukhin, the inventor of and recognized expert of the DT-1202 instrument, testified that [REDACTED]  
[REDACTED]” and he [REDACTED]  
[REDACTED] JX-0420C (Dukhin Dep. Tr.) at 237–238, 141–142 (Dr. Dukhin confirming that Smoluchowski zeta potential is the default option for all DT instruments). CMC’s corporate witness on this topic, Dr. Grumbine, [REDACTED]  
[REDACTED], RX-0678C (Grumbine Dep. Tr.) at 245, which is further supported by the [REDACTED]  
[REDACTED] *See RX-0877C* [REDACTED]); CX-0229C (Dauskardt RWS) at Q/A 848.

Respondents’ own expert Dr. Lowry conceded that Smoluchowski approximation is the most commonly used method for determining zeta potential. *See Tr. 314, 345.*

[REDACTED]

According to Dr. Lowry, “the Smoluchowski approximation is most often used for nanoparticles in aqueous media, even though the smallest nanoparticles, e.g. <20 nm diameter, may not have  $\kappa a \gg 1$  necessary to justify application of the Smoluchowski approximation.” RX-1024 (Lowry publication) at 4. In fact, the evidence shows that the commercial labs that provide zeta potential measurement services have never used any theory other than the Smoluchowski theory for calculating the zeta potential of an aqueous dispersion, including a CMP slurry. *See CX-0006C* (Dauskardt WS) Q/A 303.

Dr. Miller is therefore not correct that “a POSA would not be able to determine” if “an elementary theory or an advanced theory would be the most appropriate.” *See RX-1075C* (Miller WS) at Q/A 169. The record shows that the Smoluchowski theory is the only theory that a POSA would have reasonably used. Indeed, respondents have not identified a single use of any other theory for calculating zeta potential in the CMP industry.<sup>43</sup>

Accordingly, there is no ambiguity as to the theoretical model for calculating the zeta potential of a CMP slurry sample and the claim term is not indefinite. *See Presidio Components*, 875 F.3d at 1376 (“A patent need not explicitly include information that is already well known in the art.”).

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<sup>43</sup> Respondents’ own patents that claim zeta potential do not specify the theory for calculating it. *See CX-0229C* (Dauskardt RWS) at Q/A 827–832, 849; *Liqwd, Inc. v. L’Oreal USA, Inc.*, 720 F. App’x 623, 631 (Fed. Cir. 2018) (holding that “evidence of a challenger’s own ability to apply a term without unreasonable uncertainty counts against an indefiniteness contention”). Moreover, none of the references cited by Dr. Miller to support his noninfringement arguments discloses the theoretical model used to calculate the zeta potential. *See, e.g.*, Tr. 397; RX-1401C (Miller RWS) at Q/A 76; RX-1425C (1598 Derivatization); RX-1426C (Modeling and Positive Silica Update); RX-1427C (DE011048 Results Discussion); RX-0547 (Japanese Patent Application No. 2007-273910).

[REDACTED]

Ultimately, Dr. Miller admitted under cross examination that “no amount of information in the patent would be enough” to resolve his conclusion regarding indefiniteness (Tr. 384) and further that any CMP patent that claims zeta potential values—including the Asserted Patent, and also numerous DuPont patents discussed at the hearing—is necessarily invalid. *See* Tr. 387–389. Dr. Miller’s opinions are not persuasive given the great weight of evidence regarding the CMP industry, all of which suggests zeta potential is a well-understood parameter commonly used and relied on in this industry, both for purposes of doing business, and for regular inclusion as quantitative ranges in patent claims.

**b. “an internal nitrogen or phosphorous containing chemical species”**

Respondents argue that “CMC’s new construction ‘wherein the colloidal silica abrasive particles have a permanent positive charge of at least 15 mV’ would render the term indefinite.” *See* Resp. Br. at 130-31. However, respondents did not identify CMC’s new claim construction. Respondents appear to raise for the first time a new indefiniteness argument that the term “an internal nitrogen or phosphorous containing chemical species,” is indefinite. *See id.*; Joint Reply Outline at 4-5; Resp. Reply Br. at 33-37.

In any event, respondents did not provide any support for their positions beyond conclusory statements and unsupported expert testimony. *See id.* By contrast, Dr. Dauskardt testified that the internal chemical species limitation plainly requires “a measurable amount,” and the specification provides detailed directions and examples regarding exactly how to measure the internal chemical species. *See* JX-0001 (‘721

[REDACTED]

Patent) at 20:48–50 (describing measurement procedures for internal chemical species with ion chromatography); CX-0006C (Dauskardt WS) at Q/A 70, 73; Tr. 739. The mere fact that a claim limitation requires measurements does not render a claim indefinite. *See Guangdong*, 936 F.3d at 1362–63.

**c. Removal Rate Terms**

Claims 40-44 claim specific removal rates which, respondents argue are indefinite because “[r]emoval rate in CMP applications depends on numerous conditions and factors in addition to the claimed particle weight percent and downforce.” *See* *Resps. Br.* at 131-33; RX-1076C (Raghavan WS) Q/A 356.

However, it is not material whether there are other factors that can impact removal rate. *See* CX-0229C (Dauskardt RWS) at Q/A 868. Dr. Raghavan did not opine, nor did he cite to any evidence, that the removal rate can vary for a given CMP process under defined conditions, or that a POSA would not know how to determine the remove rate. *See* RX-1076C (Raghavan WS) Q/A 356–59. In fact, Dr. Raghavan was well aware of the term “removal rate,” Tr. 576, and cited to various references that demonstrate the definiteness of the term “removal rate.” *See* RX-1076C (Raghavan WS) Q/A 357-60. Moreover, evidence cited by Dr. Dauskardt establishes that a POSA would be able to determine “removal rate” of a given CMP process with reasonable certainty using routine procedures. *See* CX-0229C (Dauskardt RWS) at Q/A 864–70. The mere possibility that the Accused Products may be used under different conditions that may lead to a different, but quantifiable and defined removal rates does not create clear and convincing evidence that the claims are indefinite. At best this issue would impact

[REDACTED]

questions of infringement, and not patent validity. *See Ethicon Endo-Surgery*, 796 F.3d at 1319; *Bell Commc’ns Research*, 55 F.3d at 622–623.

### **3. Written Description and Enablement**

Respondents and the Staff argue that all of the asserted and DI claims are invalid under 35 U.S.C. § 112(a) for lack of enablement and written description. *See* Resp. Br. at 87-114; Staff Br. at 96-132.

CMC disagrees. *See* Compl. Br. at 163-190, 190-211.

For the reasons discussed below, respondents and the Staff have not shown by clear and convincing evidence that all of the asserted and DI claims are invalid under 35 U.S.C. § 112(a) for lack of enablement and written description.

#### **a. Applicable Law**

The Patent Act requires that “[t]he full scope of the claimed invention . . . be enabled.” *Sitrick v. Dreamworks, LLC*, 516 F.3d 993, 999 (Fed. Cir. 2008); *see also Northpoint Tech. Ltd. v. MDS America Inc.*, 413 F.3d 1301, 1308-10 (Fed. Cir. 2005) (affirming a finding of invalidity for lack of enablement due to the patent’s failure to disclose an embodiment with an antenna that met the “directional reception range” limitation of each claim). Namely, “[a] patentee who chooses broad claim language must make sure the broad claims are fully enabled. ‘The scope of the claims must be less than or equal to the scope of enablement’ to ‘ensure[] that the public knowledge is enriched by the patent specification to a degree at least commensurate with the scope of the claims.’” *Sitrick*, 516 F.3d at 999 (quoting *National Recovery Techs., Inc. v. Magnetic Separation Sys., Inc.*, 166 F.3d 1190, 1195-96 (Fed. Cir. 1999)). The enablement requirement is

[REDACTED]

satisfied when one skilled in the art, after reading the specification, could practice the claimed invention without undue experimentation. *AK Steel Corp. v. Sollac & Ugine*, 344 F.3d 1234, 1244 (Fed. Cir. 2003), citing *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988).

The question of undue experimentation is a matter of degree, and what is required is that the amount of experimentation not be “unduly extensive.” *Chiron Corp. v. Genentech, Inc.*, 363 F.3d 1247, 1253 (Fed. Cir. 2004) (quoting *PPG Indus., Inc. v. Guardian Indus., Corp.*, 75 F.3d 1558, 1564 (Fed. Cir. 1996)). For example, the fact that a clinician’s involvement may be necessary to determine effective amounts of the single compound effervescent agent and its corresponding soluble acid source does not itself constitute undue experimentation. See *Ortho-McNeil Pharm., Inc. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1365–66 (Fed. Cir. 2008) (“[E]ven if clinical trials informed the anticonvulsively effective amount, this record does not show that extensive or ‘undue’ tests would be required to practice the invention.”). In addition, extensive experimentation does not necessarily render the experiments unduly extensive where the experiments involve repetition of known or commonly used techniques. See *Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1360 (Fed. Cir. 1998) (finding that the difficulty in producing certain antibodies could not be attributed to the shortcomings in the disclosure of the patent at issue, but rather, the difficulty was attributed to the technique commonly used during experimentation that generally required repetition). Thus, the focus “is not merely quantitative, since a considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance . . . .” *PPG Indus., Inc.*, 75 F.3d at 1564 (citation and quotation omitted).

*Cephalon, Inc. v. Watson Pharms., Inc.*, 70 F.3d 1330, 1338-39 (Fed. Cir. 2013).

Enablement is determined from the viewpoint of persons of ordinary skill in the field of the invention at the time the patent application was filed. *Ajinomoto Co., Inc. v. Archer-Daniels-Midland Co.*, 228 F.3d 1338, 1345 (Fed. Cir. 2000). Thus, a claim in an issued patent can be rendered invalid due to lack of enablement if its scope is not fully enabled. *Id.*

[REDACTED]

The issue of whether a patent is invalid for failure to meet the written description requirement of 35 U.S.C. § 112, ¶ 1 is a question of fact. *Bard Peripheral Vascular, Inc. v. W.L. Gore & Assocs., Inc.*, 670 F.3d 1171, 1188 (Fed. Cir. 2012). A patent’s written description must clearly allow persons of ordinary skill in the art to recognize that the inventor invented what is claimed. The test for sufficiency of a written description is “whether the disclosure of the application relied upon reasonable conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Id.* (quoting *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (*en banc*)).

Enablement is a separate inquiry from written description, although the two “often rise and fall together.” *Ariad*, 598 F.3d at 1352. To be enabling, “the specification of a patent must teach those skilled in the art how to make and use the full scope of the claimed invention without undue experimentation.” *See Union Carbide Chemicals & Plastics Tech. Corp. v. Shell Oil Co.*, 308 F.3d 1167, 1186 (Fed. Cir. 2002). Importantly, “a considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question provides a reasonable amount of guidance with respect to the direction in which the experimentation should proceed.” *PPG Indus., Inc. v. Guardian Indus. Corp.*, 75 F.3d 1558, 1564 (Fed. Cir. 1996). In evaluating whether experimentation rises to the level of undue, courts often consider the factors articulated in *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988).

Additionally, “Section 112 requires enablement of only the claimed invention, not matter outside the claims.” *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 959 F.3d 1091, 1100 (Fed. Cir. 2020). When the claims at issue do not recite a particular method

[REDACTED]

of making a claimed composition, “the enablement requirement is met if the description enables any mode of making and using the invention.” *Invitrogen*, 429 F.3d at 1071.

Similarly, Section 112 “does not require that a patent disclosure enable one of ordinary skill in the art to make and use a perfected, commercially viable embodiment.”

*Vasudevan Software, Inc. v. MicroStrategy, Inc.*, 782 F.3d 671, 684 (Fed. Cir. 2015).

Further, there is no requirement that the specification include working examples, or set forth “how or why the invention works.” *Alcon Research Ltd. v. Barr Labs., Inc.*, 745 F.3d 1180, 1189–90 (Fed. Cir. 2014). As with written description, the burden is with the challenger to show by clear and convincing evidence that the specification in its entirety is not enabling. *Id.*

**b. Respondents’ argument regarding “permanent positive charge”**

The asserted and DI claims recite CMP compositions having “permanent positive charge of at least [15 or 13] mV.” Respondents argue this range is invalid because it is “open-ended.” The ‘721 patent describes and enables this claimed range.

**i. Whether the “permanent positive charge” limitation is sufficiently disclosed**

Possession of an open-ended range is achieved when there “is an inherent, albeit not precisely known, upper limit and the specification enables one of skill in the art to approach that limit.” *Andersen Corp. v. Fiber Composites, LLC*, 474 F.3d 1361, 1376 (Fed. Cir. 2007) (quoting *Scripps Clinic & Research Found. v. Genentech, Inc.*, 927 F.2d 1565, 1572 (Fed. Cir. 1991)). In this investigation, there is no dispute that a POSA would have understood “permanent positive charge” to have an inherent upper limit. Dr.

[REDACTED]

Dauskardt testified that “in the area of these aqueous colloidal solutions containing particles, it would be very well understood that there is an upper limit [for permanent positive charge].” Tr. 628; *see also id.* at 750 (“[I]t would be well understood … that there are limits to the value that you would expect that anybody working in this field would know.”); CX-0229C (Dauskardt RWS) at Q/A 731, 749–50.

Indeed, the only expert testimony offered by respondents on this issue comes from Dr. Klein, an expert in colloidal science who admits she is not an expert on the issues of zeta potential and permanent positive charge. Tr. 439 (“Q. And that’s because you’re not an expert on zeta potential, right? A. That’s correct.”); *see also* RX-1073C (Klein WS) at Q/A 117 (acknowledging that “zeta potential values are necessary elements of a ‘permanent positive charge’”). Respondents argue that “there is no basis for a POSA to have understood there to be an inherent limit of 50 mV for the PPC or zeta potential values.” *See* Resp. Br. at 109. Dr. Klein does not contest that a POSA would have understood permanent positive charge to be inherently limited. Rather, she only opines that a POSA would not have understood permanent positive charge “to be limited to about 50 mV.” *See* RX-1073C (Klein WS) at Q/A 137–38. Whether a POSA would have understood a precise value for an inherent upper limit is immaterial, as the law does not require a “precisely known” upper limit. *Andersen Corp.*, 474 F.3d at 1376.

Additionally, the ‘721 patent describes and conveys possession of compositions across the inherently limited permanent positive charge range. For example, the ‘721 patent repeatedly describes the types of structures that a POSA would understand could achieve permanent positive charge—charged species inside the particle as well as surface treatments, which are components strongly associated (*e.g.*, covalently bonded) with the

[REDACTED]

particle surface. *See* JX-0001 ('721 Patent) at 11:6–10; CX-0229C (Dauskardt RWS) at Q/A 732, 740. All experts appear to agree internal chemical species and covalently bound species would provide permanent positive charge. *See* Tr. 456 (Dr. Klein testifying that aminosilane surface treatment “won’t wash off because it’s chemically bonded”), 541 (Dr. Raghavan testifying that “it is well known that when you have a covalent bond, it is not going to break. When you rinse with water, it is not going to come out”); 468, 470 (Dr. Klein agreeing that if there is “a nitrogen-containing catalyst that’s incorporated in the particle,” there would be “nothing to wash off” the particle during the three-step filtration process for measuring permanent positive charge), 762 (Dr. Dauskardt testifying that “bound aminosilane, strongly associated with the surface” and “internally-incorporated nitrogen species” provide permanent positive charge); RX-1076C (Raghavan WS) at Q/A 588 (“Because their charge is based on internally incorporated nitrogen-containing catalyst … their charge would be ‘permanent.’”).

Using these structures, the '721 patent also describes example polishing compositions, such as 10A, made with an internal chemical species and a surface bonded aminosilane in accordance with Example 13, and having a permanent positive charge of about 35–39 mV. *See* JX-0001 ('721 Patent) at 26:61–28:50; CX-0229C (Dauskardt RWS) at Q/A 731, 742–45; CX-0229C (Dauskardt RWS) at Q/A 745; CX-0002C (Grumbine WS) at Q/A 39; CX-0227C (Grumbine RWS) at Q/A 30. Example 15 also conveys possession of compositions practicing the claimed permanent positive charge range. *See, e.g.*, Klein Tr. 456 (Dr. Klein testifying about Example 15), Dauskardt Tr. 630 (Dr. Dauskardt testifying that “we can certainly infer from other examples that they also would have had a permanent positive charge”).

[REDACTED]

Dr. Klein concedes that the ‘721 patent describes example compositions with permanent positive charge and structures a POSA would expect to provide permanent positive charge. *See RX-1073C (Klein WS)* at Q/A 125; Tr. 456. However, she opines that the compositions like 10A are not within the scope of any claims because they do not show possession of external aminosilane or internal EOPA. *See RX-1073C (Klein WS)* at Q/A 125. Dr. Klein’s opinion is inconsistent with the knowledge of a POSA. Aminosilane bonding with colloidal silica abrasive particles was a “[v]ery well understood” area and taught in Example 13. JX-0001 (‘721 Patent) at 30:30–32 (“(APTMS) … was added to the mother liquid”); Dauskardt Tr. 643 (“[A]nybody reading this Example 13 would absolutely know … there would be aminosilane bound to the surface.”), 757; *see also RX-1073C (Klein WS)* at Q/A 217.

Likewise, despite Dr. Klein’s opinion that “it is not necessarily the case that the amine catalyst, such as EOPA, would be incorporated” (*id.* at Q/A 179), the ‘721 patent describes numerous techniques for doing just that. *See* Tr. 643 (Dr. Dauskardt testifying that “clearly this is an example that intends to provide a recipe for making these particles with included EOPA”); JX-0001 (‘721 Patent) at 30:19–37, 20:32–38, 32:36–42 (describing fabrication processes for making particles with internal EOPA); CX-0229C (Dauskardt RWS) at Q/A 742, 776; RX-1073C (Klein WS) at Q/A 273 (Example 15 is “disclosing some particles containing an internal EOPA species”).

**ii. Whether the ‘721 patent enables the  
“permanent positive charge” element**

As noted above, an open-ended range is enabled when there “is an inherent, albeit not precisely known, upper limit and the specification enables one of skill in the art to

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approach that limit” without undue experimentation. *Andersen Corp.*, 474 F.3d at 1376.

For many of the same reasons explained above with respect to written description, the ‘721 patent would have enabled a POSA to practice the claims with CMP compositions approaching the inherent upper limit for permanent positive charge. In addition to the disclosures noted above, the ‘721 patent discloses at least three methods of achieving desired levels of permanent positive charge, including by:

- (1) incorporating two or more positively charged species within the particles, JX-0001 ('721 Patent) at 4:59–65 (“It will be understood that the colloidal silica abrasive particles may include two or more of the above described chemical species incorporated in the particles.”), 28:13–50 (Example 10), 30:20–43 (Example 13);
- (2) using internally incorporated positively charged species and surface treatment in combination, JX-0001 ('721 Patent) at 7:33–64 (describing “incorporating a positively charged chemical species into the abrasive particles and then further bonding (via surface treating) the same or a different chemical species to the particle surface”), 11:6–10 (“A permanent positive charge may further result from a covalent interaction between the particle and a positively charged species.”), 32:36–33:35 (Example 15), and
- (3) controlling the amount of chemical species in the particles. JX-0001 ('721 Patent) at 20:48–21:31 (Example 2); *see also* CX-0229C (Dauskardt RWS) at Q/A 762–64.

A POSA would have been able to formulate CMP compositions approaching the inherent upper limit for permanent positive charge with nothing more than routine experimentation in view of these disclosures. *See* CX-0229C (Dauskardt RWS) at Q/A 731–40; *see also* Tr. 763 (“I could give this to a member of my lab and tell them to do it and I would have complete confidence that they would be able to do it.”).

Dr. Klein admitted on cross examination that the ‘721 patent “describes using surface treatment in combination with low levels of internal nitrogen or internal charge to

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achieve the desired levels of permanent positive charge.” Tr. 453. A POSA would have followed these disclosures to practice the full scope of the “permanent positive charge” elements without undue experimentation. *See CX-0229C* (Dauskardt RWS) at Q/A 757; *see also id.* at Q/A 762–64; CDX-0007C.021–22 (JX-0001).

Finally, Dr. Klein cites CMC documents and opines they demonstrate the inventors faced “difficulty” in achieving permanent positive charges of greater than 50 mV, leading to her conclusion that undue experimentation would be required to practice the full scope of the claims. *See id.* at Q/A 137, 144–147. However, as Dr. Klein acknowledged, the cited documents do not demonstrate that the inventors were trying to create compositions with permanent positive charge higher than 50 mV, or that the inventors would have faced difficulty doing so. Tr. 440 (“Q: Isn’t it possible that they weren’t trying to achieve permanent positive charge values of greater than 50 millivolts? A. That’s possible.”); CX-0229C (Dauskardt RWS) at Q/A 754–56. The documents merely demonstrate a well-known relationship between pH and zeta potential, which is disclosed in the ‘721 patent. *See e.g.*, JX-0001 (‘721 Patent) at 10:47–54 (“The zeta potential is typically dependent on the pH of the aqueous medium.”); CX-0229C (Dauskardt RWS) at Q/A 754. They do not support Dr. Klein’s conclusion that the disclosures of the ‘721 patent are limited to the specific examples she identified. *See CX-0229C* (Dauskardt RWS) at Q/A 755.

**c. Respondents’ Section 112 arguments regarding the “chemical species” limitation**

The asserted and DI claims each recite “a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof, wherein the

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chemical species is a nitrogen containing compound or a phosphorus containing compound.” Independent claim 1 further recites that “the chemical species is not an aminosilane or a phosphonium silane.” The ‘721 patent fully describes and enables these limitations.

Respondents’ argument that this limitation is not disclosed or enabled relies on respondents’ proposed claim construction, which erroneously imports a functional requirement into the claims. According to respondents, the genus of nitrogen-containing compounds and phosphorus-containing compounds is defined not by its chemical compositions, but by its function; according to respondents, only those internal species that alone “provide the claimed PPC” at the claimed levels qualify. *See* Resp. Br. at 97. Respondents frame the written description and enablement inquiry this way to invoke Federal Circuit precedent from the pharmaceutical industry, where patent claims frequently encompass a genus of compounds defined and claimed based on their ability to achieve a desired therapeutic effect. *See, e.g., Idenix Pharm. LLC v. Gilead Scis. Inc.*, 941 F.3d 1149, 1155 (Fed. Cir. 2019), cert. denied sub nom. *Idenix Pharm. v. Gilead Scis., Inc.*, No. 20-380, 2021 WL 161021 (U.S. Jan. 19, 2021) (analyzing claims directed to “some set of compounds that are effective for treatment of HCV”); *AbbVie Deutschland GmbH & Co., KG v. Janssen Biotech, Inc.*, 759 F.3d 1285, 1292 (Fed. Cir. 2014) (“The claims … at issue in these appeals define the claimed antibodies by their function … rather than by structure.”); *Ariad*, 598 F.3d at 1341 (“The claims are thus genus claims, encompassing the use of all substances that achieve the desired result.”); *AbbVie*, 759 F.3d at 1301 (“[f]unctionally defined genus claims can be inherently vulnerable to invalidity challenge for lack of written description support”).

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Respondents rely on the incorrect premise that the asserted and DI claims represent a functionally defined genus. *See, e.g.*, Resp. Br. at 87, 105 (citing *Idenix*), 88, 108 (citing *AbbVie*). When properly construed, the asserted and DI claims define the claimed compositions in terms of their structure, not their functionality. Whether or not a colloidal silica abrasive particle includes internal nitrogen or phosphorous compounds is a structural property. Likewise, the zeta potential and permanent positive charge of a collection of particles in a CMP slurry is a physical property of the slurry. *See, e.g.*, CX-0229C (Dauskardt RWS) at Q/A 821 (“Zeta potential is a standard parameter frequently measured in the CMP industry.”). As such “[t]he claims in this case, not involving functional claim language, do not present the fundamental difficulty presented by the claims in virtually all of the precedents on which Defendants rely.” *GlaxoSmithKline*, 744 F.3d at 731.

i. **Whether the “chemical species” limitation is sufficiently disclosed**

As required under the law, the ‘721 patent’s disclosure of the “chemical species” “details ‘relevant identifying characteristics’” such that members of the genus can be distinguished from compounds outside the genus. *Pfizer Inc. v. Teva Pharm. USA, Inc.*, 555 F. App’x 961, 968 (Fed. Cir. 2014). Specifically, description of a genus “requires the disclosure of either a representative number of species falling within the scope of the genus or structural features common to the members of the genus so that one of skill in the art can ‘visualize or recognize’ the members of the genus.” *Ariad*, 598 F.3d at 1350. Importantly, “the amount of disclosure necessary to satisfy the written-description requirement ‘will necessarily vary depending on the context,’ considering such facts as

‘the existing knowledge in the particular field’ … and ‘the predictability of the aspect at issue.’” *Ajinomoto Co. v. Int'l Trade Comm'n*, 932 F.3d 1342, 1359 (Fed. Cir. 2019), *cert. denied sub nom. CJ CheilJedang Corp. v. Int'l Trade Comm'n*, 141 S. Ct. 132, 207 L. Ed. 2d 1078 (2020) (quoting *Ariad*, 598 F.3d at 1351).

The ‘721 patent specification meets this standard at least because it provides extensive disclosure of nitrogen- and phosphorous-containing compounds suitable for use in the claimed invention. *See, e.g.*, CDX-0007C.018 (CX-0229C (Dauskardt RWS) at Q/A 761; JX-0001 ('721 Patent) at 3:23–4:44). In this regard, the ‘721 patent explicitly describes “relevant identifying characteristics” and “structural features” of nitrogen and phosphorus-containing compounds, as required by the Federal Circuit, including specific chemical formulas and names:

When the chemical species is a phosphorus-containing compound it preferably includes a phosphine containing compound or phosphonium containing compound. An ammonium compound may include  $R_1R_2R_3R_4N^+$  and a phosphonium compound may include  $R_1R_2R_3R_4P_3^+$ , where  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_4$  represent independently hydrogen, C<sub>1</sub>-C<sub>6</sub> alkyl, a C<sub>7</sub>-C<sub>12</sub> arylalkyl, or a C<sub>6</sub>-C<sub>10</sub> aryl.

JX-0001 ('721 Patent) at 3:27–36; *Pfizer*, 555 F. App'x at 968. A POSA would have understood claims 1 and 26 to impose “commonsense bounds” on the internal chemical species, consistent with these disclosures of positively charged species ( $R_1R_2R_3R_4N^+$  and  $R_1R_2R_3R_4P_3^+$ ) able to be incorporated in known colloidal silica abrasive particles (as recited in the claims). *See* Dauskardt Tr. 631–632 (testifying with respect to the aminosilane recited in Example 13 that “[t]here would be absolute commonsense bounds” and that “you would use something that would be similar, that was similar to those described and disclosed”).

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Moreover, as respondents' expert Dr. Klein acknowledged during the evidentiary hearing, the '721 patent provides numerous working examples (including examples 2, 6, 10, 13, and 15) demonstrating possession of CMP slurries with colloidal silica particles having various internal nitrogen containing compounds. *See, e.g.*, Tr. 455 (testifying that Example 15 describes particles that "have internal EOPA"), 468 (testifying that Example 2 describes "nitrogen-containing catalyst that's incorporated in the particle"); RX-1073C (Klein WS) Q/A 174 (acknowledging that composition 10A is "described as having an internally incorporated nitrogen species, specifically an aminosilane, and a permanent positive charge"), 185 ("Example 6 shows TMAH containing particles"). Likewise, a POSA would understand that the disclosed phosphorus containing compounds would work as well. *See* CX-0229C (Dauskardt RWS) at Q/A 772 (the patent examples "further demonstrate the '721 patent's teachings that...phosphorous containing species can be incorporate inside colloidal silica abrasive particles to achieve positive charge"); CX-0227C (Grumbine RWS) at Q/A 37 ("the same methodologies" to incorporate an internal chemical species "could be used for both nitrogen-and phosphorous-containing species"). In sum, a POSA would readily have understood the inventors to be in possession of the genus of nitrogen- or phosphorus-containing compounds to incorporate into colloidal silica particles as claimed.

Further, the sufficiency of this disclosure of chemical species must be considered from the perspective of a POSA in light of the existing knowledge in the field and "the predictability of the aspect at issue." *See, e.g.*, *Ariad*, 598 F.3d at 1351. Respondents' experts testified that the Stober process that is used to make these particles was well understood and would have been expected to predictably incorporate nitrogen containing

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species into the particles. *See, e.g.*, Tr. 506 (Dr. Raghavan testifying that “skilled artisans would thus expect such Stober particles to incorporate some amount of the nitrogen-containing Stober catalyst based on the Stober reaction”); RX-1073C (Klein WS) at Q/A 179 (“One of ordinary skill in the art would understand that the Stober process always results in a particle that contains nitrogen”); *see also* Dauskardt Tr. 631–632 (testifying with respect to the aminosilane recited in Example 13 that “[t]here would be absolute commonsense bounds” and that “you would use something that would be similar, that was similar to those described and disclosed”).

In view of these undisputed disclosures, respondents’ argument that the ‘721 patent does not “indicate which nitrogen or phosphorus containing species will provide a colloidal silica particle or a CMP slurry with the claimed PPC of at least 13 or 15 mV” is misguided. *See* Resp. Br. at 98. Respondents have not shown lack of written description by clear and convincing evidence in view of this evidence. *See Ajinomoto*, 932 F.3d at 1361 (rejecting written description challenge where “a skilled artisan could make relatively predictable changes” to practice the claimed invention); *Hologic, Inc. v. Smith & Nephew, Inc.*, 884 F.3d 1357, 1362 (Fed. Cir. 2018) (finding adequate written description of “light guide” genus based on disclosure of single “fibre optics bundle” species in predictable art).

Respondents argue that “[t]he ‘721 patent specification fails to show that the alleged inventors enabled or possessed the full scope of claimed CMP slurries comprising colloidal silica abrasive particles having incorporated therein.” *See* Resp. Br. at 97; *see also* RX-1073C (Klein WS) at Q/A 198. This is not correct. While the testing the applicants disclosed in the working examples used nitrogen-containing compounds, the

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specification elsewhere repeatedly discloses that phosphorus containing compounds could be used as well. *See, e.g.*, JX-0001 ('721 Patent) at 3:29–36, 3:44–52, *see also id.* at abstract, 2:21, 2:53, 14:60; CX-0229C (Dauskardt RWS) at Q/A 772 (the patent examples “further demonstrate the ‘721 patent’s teachings that...phosphorous containing species can be incorporate inside colloidal silica abrasive particles to achieve positive charge”), Q/A 789 (“the ‘721 Patent describes multiple particle fabrication techniques for incorporating chemical species and multiple phosphorous containing species suitable for use in the claimed invention, including from column 3, line 27 to column 4, line 37.... a person of ordinary skill would have expected phosphorous compounds with similar chemical structure to the exemplary nitrogen containing compounds in the ‘721 Patent’s working examples to produce colloidal silica particles with similar characteristics.”); CX-0227C (Grumbine RWS) at Q/A 37 (“the same methodologies” to incorporate an internal chemical species “could be used for both nitrogen-and phosphorous-containing species”); CX-0228C (Dysard RWS) at Q/A 32.

In any event, it is well settled that working examples of every species within the claim scope are not required to satisfy the written description requirement. *See, e.g.*, *Falko-Gunter*, 448 F.3d at 1366 (“A claim will not be invalidated on section 112 grounds simply because the embodiments of the specification do not contain examples explicitly covering the full scope of the claim language.”) (internal quotations omitted); *Engel Indus., Inc. v. Lockformer Co.*, 946 F.2d 1528, 1531 (Fed. Cir. 1991) (“A patentee is not required to disclose all possible examples and scenarios as such disclosure would be boundless, and the pitfalls endless.”).

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**ii. Whether the “chemical species” limitation is enabled**

There is no dispute that the ‘721 patent enables the claimed structure of colloidal silica abrasive particles with an internal “chemical species” under the correct claim constructions, which as explained above, do not impose any unrecited functional requirements on the claims, and do not require that the claimed threshold permanent positive charge results solely from the internally incorporated chemical species (as opposed to a combination of internal charge and external surface treatment), and which (for claim 1) do not preclude the presence of aminosilane in the colloidal silica abrasive particles in addition to the recited chemical species.

Where, as here, the claims recite a composition and do not require that the composition to be made according to a particular method, “the enablement requirement is met if the description enables any mode of making and using the invention.” *Invitrogen, Inc.*, 429 F.3d at 1071; *see also Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1361 (Fed. Cir. 1998) (“Hopkins is correct; CellPro can carry its burden only by showing that all of the disclosed alternative modes are insufficient to enable the claims.”). Respondents’ expert Dr. Klein admits that the ‘721 patent “not only describes multiple different nitrogen-containing compounds, it also describes multiple methods for incorporating those compounds into the particles.” Tr. 449, 450 (“[C]olumn 7 also specifically describes a process for incorporating an alkali catalyst such as ethylenediamine, TMAH, or EOPA into the colloidal silica particles.”), 450 (“[T]he patent describes a process for incorporating an aminosilane into the outer shell of a colloidal silica particle.”); *see also RX-1073C* (Klein WS) at Q/A 213 (recognizing that

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the ‘721 patent discloses “incorporating positively charged species in the particle by co-growing the particle (as in Example 13)”). Another of respondents’ expert testified that a POSA would “expect” the Stober process could incorporate internal chemical species. Tr. 506 (Raghavan testifying that “skilled artisans would thus expect such Stober particles to incorporate some amount of the nitrogen-containing Stober catalysts based on the Stober reaction”).

In short, it is undisputed that a POSA would have been able to fabricate colloidal silica abrasive particles using a wide range of nitrogen and phosphorous containing species using the numerous fabrication methods in the ‘721 patent. *See CX-0229C* (Dauskardt RWS) at Q/A 761–62; Tr. 644 (Dr. Dauskardt testifying “I could give this to a member of my lab and say: Go make these particles with included EOPA, without showing them anything else”); *see also JX-0025* (File History) at 34 (“Applicants provide multiple strategies for forming the colloidal silica abrasive particles having a positive charge by incorporating a chemical species internal to an outer surface thereof.”). This is more than sufficient to enable the claims. *Invitrogen, Inc.*, 429 F.3d at 1071 (where claims do not require the composition to be made according to a particular method, “the enablement requirement is met if the description enables any mode of making and using the invention”); *see also Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1361 (Fed. Cir. 1998) (“Hopkins is correct; CellPro can carry its burden only by showing that all of the disclosed alternative modes are insufficient to enable the claims.”).

### **iii. The ‘721 patent specification**

There is no dispute that the ‘721 patent describes and enables colloidal silica abrasive particles having an internal chemical species that contributes to a permanent

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positive charge of 13 or 15 mV. Regarding written description, the patent describes multiple methods of accomplishing this result. For example, Dr. Klein admits that the ‘721 patent “describes using surface treatment in combination with low levels of internal nitrogen or internal charge to achieve the desired levels of permanent positive charge.”

Tr. 453, 454 (“[C]olloidal silica abrasive particles may advantageously achieve such high charge levels using very low surface treatment levels of the aminosilane.”). Indeed, the ‘721 patent makes this explicit:

Positively charged colloidal silica abrasive particles may alternatively be obtained via *incorporating a positively charged chemical species into the abrasive particles and then further bonding (via surface treating) the same or a different chemical species to the particle surface.* ... [T]he colloidal silica abrasive particles may include an internal chemical species including a nitrogen-containing alkali catalyst having from 1 to 6 carbon atoms (such as the aforementioned ethylenediamine, TMAH, or EOPA). The abrasive particles may then further be surface treated, for example, with an aminosilane compound.

JX-0001 (‘721 Patent) at 7:33–50 (emphases added); *see also id.* at 11:6–10 (“A permanent positive charge may further result from a covalent interaction between the particle and a positively charged species.”); *see also* CX-0229C (Dauskardt RWS) at Q/A 763; Staff Br. at 61 (“[The] specification makes clear that aminosilane is bonded with the outer surface of the colloidal silica abrasive particles as an adjunct or supplement to the internally-incorporated chemical species, so that the overall charge of the particles (reflecting the contributions of both the internally-incorporated chemical species and the surface-bonded aminosilane) exceeds the 13 mV ‘permanent positive charge’ threshold.”). Dr. Klein also agreed that the ‘721 patent has working examples demonstrating how to practice the claims using this method. *See* Tr. 455–456 (testifying

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that Example 15 describes particles with “internal EOPA and an external aminosilane surface treatment” and permanent positive charge greater than 15 mV).

Regarding enablement, a POSA would have been able to use this expressly disclosed method—surface treatment in combination with low levels of internal nitrogen—to practice the asserted and DI claims with the claimed genus of nitrogen or phosphorus containing compounds, without undue experimentation. *See* Tr. 763 (“I could give this to a member of my lab and tell them to [create permanent covalent bonds with the aminosilane and the surface] and I would have complete confidence that they would be able to do it.”). Respondents’ experts do not persuasively dispute this point. *See, e.g.*, Tr. 456 (Dr. Klein acknowledging that the aminosilane surface treatment described in Example 15 would be expected to provide permanent positive charge); RX-1073C (Klein WS) at Q/A 227 (acknowledging Example 13 provides “detail (e.g., amounts of reagents, addition rates, temperature, total time, etc.)”).<sup>44</sup>

Respondents argument excludes any contribution of aminosilane surface treatment to the threshold permanent positive charge, and requires the permanent positive charge of at least 13 or 15 mV to result solely from the internal chemical species. *See, e.g.*, Resps. Br. at 98-99; RX-1073C (Klein WS) at Q/A 162, 166, 168, 200.

Yet, the ‘721 patent “has an incredibly detailed set of examples” and discloses multiple ways of achieving permanent positive charge solely from internal chemical species. *See* Dauskardt Tr. 625-626. For example, regarding claim 26, Dr. Klein admits

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<sup>44</sup> As explained in a later section of this ID, Staff’s argument that sample 10C shows that the invention did not work appears not to account for the fact that 10C was included as a control—to demonstrate what is not the invention. *See* Section IV.D.3.e.ii (The Staff’s Enablement Arguments), *infra*.

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that the ‘721 patent describes particles “having an internally incorporated nitrogen species, specifically an aminosilane, and a permanent positive charge,” as demonstrated by example composition 10A (which has a permanent positive charge of greater than 30 mV). *See RX-1073C (Klein WS) Q/A 174; JX-0001 (‘721 Patent) at 28:35–50; CX-0229C (Dauskardt RWS) at Q/A 742–45, 776.*

There are also detailed instructions for fabricating the particles used in composition 10A, including specific temperatures, amounts of chemical species, timing, and sequence, which a POSA would have been able to follow to routinely prepare particles practicing at least claim 26, having aminosilane bonded with the external particle surface. *See CX-0229C (Dauskardt RWS) at Q/A 761–62; CDX-0007C.019–20 (JX-0001 (‘721 Patent)); RX-1073C (Klein WS) at Q/A 213 (recognizing that the ‘721 patent discloses “incorporating positively charged species in the particle by co-growing the particle (as in Example 13)”), Q/A 179 (“One of ordinary skill in the art would understand that the Stober process always results in a particle that contains nitrogen.”), Q/A 227 (acknowledging Example 13 provides “detail (e.g., amounts of reagents, addition rates, temperature, total time, etc.)”). Thus, respondents cannot support their argument that claim 26 is invalid under Section 112, even under their improper reading of the claim.<sup>45</sup>*

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<sup>45</sup> The same disclosures also describe and enable claim 1 as properly construed to allow for aminosilane and other chemical species, as example 10A incorporates both EOPA and aminosilane. *See CX-0229C (Dauskardt RWS) at Q/A 762; JX-0001 (‘721 Patent) at 4:59–65 (“It will be understood that the colloidal silica abrasive particles may include two or more of the above described chemical species incorporated in the particles.”), 30:19–37 (Example 13 - “(EOPA) was added to the mixture ... and 16.3 grams of 3-aminopropyltrimethoxysilane (APTMS).”).*

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Additionally, the ‘721 patent also describes working examples, including Examples 2, 6, and 10 demonstrating compounds that provide levels of positive charge solely from internal chemical species (TMAH, EOPA, and aminosilane). *See JX-0001* (‘721 Patent) at 21:6–25 (showing measured zeta potentials between 8 to 18 mV for particles with internally incorporated EOPA and TMAH), 24:44–60 (showing measured zeta potential of up to 18 mV for particles with internally incorporated TMAH). A POSA would have been guided by the ‘721 patent to adjust the concentration of internal chemical species to achieve the claimed levels of permanent positive charge. *See JX-0001* (‘721 Patent) at 21:6–25 (demonstrating how increasing chemical species concentration can increase zeta potential); CX-0229C (Dauskardt RWS) at Q/A 764, 780. These disclosures are more than sufficient. *See, e.g., PPG Indus.*, 75 F.3d at 1564 (“[A] considerable amount of experimentation is permissible ... the specification in question provides a reasonable amount of guidance with respect to the direction in which the experimentation should proceed.”); *Invitrogen*, 429 F.3d at 1071 (“[T]he enablement requirement is met if the description enables any mode of making and using the invention.”).

Respondents’ expert Dr. Klein does not address these disclosures and instead misinterprets a narrow subset of the ‘721 patent’s many examples. For example, Dr. Klein places substantial emphasis on Example 2 to opine that “the fact that two of the three species in Example 2 do not provide a zeta potential of even 13 or 15 mV shows that the named inventors did not have possession of or had enabled the broad scope of incorporated chemical species” and renders the limitation unpredictable. *See e.g., RX-1073C* (Klein WS) at 185. That some compositions in Example 2 have zeta potential

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below 13 mV does not imply unpredictability or a lack of possession. To the contrary, Example 2 demonstrates incorporation of three different nitrogen-containing species and particle structures that respondents' expert acknowledged would be expected to provide permanent positive charge. *See* Tr. 452 (Dr. Klein testifying that compositions 2A and 2B "have EOPA," 2C and 2D have "incorporated" TMAH, and 2E and 2F "have internal ethylenediamine"), 469:24–470:19 (Dr. Klein acknowledging that the particles described in Example 2 have "nothing to wash off" in the filtration procedure for measuring permanent positive charge).

In any event, Dr. Klein's opinion concerning whether Example 2 uses particles with internal nitrogen is irrelevant, as she acknowledges that the '721 patent "describes multiple methods for incorporating [nitrogen-containing] compounds into the particles." Tr. 449; *see also Invitrogen*, 429 F.3d at 1071 ("[T]he enablement requirement is met if the description enables any mode of making and using the invention."). On this point Dr. Klein is correct. *See, e.g.*, JX-0001 ('721 Patent) at 5:42–44 ("[C]olloidal silica abrasive particles having an internal chemical species may be fabricated, for example, via ...."), 28:13–50 (Example 10), 30:20–43 (Example 13); CX-0229C (Dauskardt RWS) at Q/A 762–64.

#### **iv. Respondents' cited cases**

Finally, respondents rely on a series of pharmaceutical cases to support their written description and enablement arguments, including *Wyeth & Cordis Corp. v. Abbott Labs.*, 720 F.3d 1380 (Fed. Cir. 2013), and *Idenix Pharm. LLC v. Gilead Scis. Inc.*, 941 F.3d 1149 (Fed. Cir. 2019). The claims in those cases are materially different from the claims here. There, the claims recited a functionally defined genus encompassing "an

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“effective amount” of a compound selected from a large genus of candidate compounds for treating or preventing diseases. *Wyeth*, 720 F.3d at 1385 (claims require a POSA to assess each compound for “immunosuppressive and antirestenotic effects”); *Idenix*, 941 F.3d at 1155 (“In combination with the requirement to administer an ‘effective amount,’ this claim language ‘limits the scope of the claims to the use of some set of compounds that are effective for treatment of HCV.’”). In these cases, it was determined that the patents did not have enough disclosure of how to select and identify such an “effective amount” from among the compounds or how to determine an “effective” amount beyond known methods of synthesis and screening. *Wyeth*, 720 F.3d at 1382, 1385–86; *Idenix*, 941 F.3d at 1155–57.

Unlike the claims in *Wyeth* and *Idenix*, the claims here are not defined by a function to be achieved, but rather solely by their physical properties. The Federal Circuit has already differentiated between the type of claims in the ‘721 patent and the type in *Idenix* and *Wyeth*. For example, in *GlaxoSmithKline LLC v. Banner Pharmacaps, Inc.*, 744 F.3d 725 (Fed. Cir. 2014), the Court considered claims to a chemical compound and its “solvates.” *Id.* at 727. In assessing the written description requirement, the Court found that “the claim term ‘solvate’ refers to a molecular complex defined by structure and by the process of creating it, not by what the molecule does.” *Id.* at 729. The Court held that the patent’s description of a solvate as a “complex of dutasteride molecules and solvent molecules” that is “created by...dissolving dutasteride (the solute) in a solvent” provided a sufficient “description by structure and process of creation that matches the claimed term.” *Id.* at 730. Accordingly, the Court held “[t]he claims in this case, not involving functional claim language, do not present the fundamental difficulty presented

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by the claims in virtually all of the precedents on which Defendants rely” in which functional claiming recites “the problem to be solved...while claiming all solutions to it.” *Id.* at 731 (Fed. Cir. 2014).

*GlaxoSmithKline* is instructive here. As in that case, the claimed “colloidal silica abrasive particles” incorporating a chemical species internal to the outer surface of the particles is purely structural. As explained above, there is no dispute that the ‘721 patent describes several ways of making that structure. *See* Tr. 449 (Dr. Klein testifying that the ‘721 patent “describes multiple methods for incorporating [nitrogen-containing] compounds into the particles”); CX-0229C (Dauskardt RWS) Q/A 761. This is not a case of functional claiming that “cover[s] any compound later actually invented and determined to fall within the claim’s functional boundaries.” *GlaxoSmithKline*, 744 F.3d at 731. “The claim term and its corresponding description, however broad, identify certain structures produced by certain processes. [The Federal Circuit has] not required more for an adequate written description that matches claim scope.” *Id.*

Even under respondents’ interpretation of the “chemical species” limitation as requiring the function of contributing to the permanent positive charge of the particles, the claims and disclosures of the ‘721 patent are materially different from those in *Wyeth* and *Idenix*.<sup>46</sup> As the Federal Circuit recently explained, “[w]hat emerges from our case

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<sup>46</sup> *AbbVie*, 759 F.3d, also addresses different facts. In that case, “[t]he asserted claims attempt to claim every fully human IL-12 antibody that would achieve a desired result, i.e., high binding affinity and neutralizing activity, and cover an antibody as different as Stelara, whereas the patents do not describe representative examples to support the full scope of the claims.” *Id.* at 1301. The Court focused on the functional requirements of the claims, stating “[f]unctionally defined genus claims can be inherently vulnerable to invalidity challenge for lack of written description support, especially in technology fields that are highly unpredictable, where it is difficult to establish a correlation between

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law is that the enablement inquiry for claims that include functional requirements can be particularly focused on the breadth of those requirements.” *Amgen*, 2020-1074, 2021 WL 501114, at \*4. In *Amgen*, each claim was “defined, not by structure, but by meeting functional limitations,” and the claims were “far broader in functional diversity than the disclosed examples.” *Id.* at \*5. For example, the claims at issue recited antibodies that bind to one or more of fifteen amino acids (*i.e.*, “residues”), and none of the examples in the specification could bind to three of the claimed residues. *Id.* at \*1, \*5 n.1. The Federal Circuit affirmed the district court’s enablement finding given “the use of broad functional claim limitations[, which] raises the bar for enablement.” *Id.* *Wyeth* and *Idenix*, like *Amgen*, involved claims with extensive functional breadth, encompassing compounds that achieved desired therapeutic effects in distinct ways. *See id.*; *Wyeth*, 720 F.3d at 1385 (“[E]ven minor alterations to the sirolimus molecule could impact its immunosuppressive and antirestenotic properties.”); *Idenix*, 941 F.3d at 1158–59 (rejecting patentee’s “attempts to narrow the claim to only those nucleosides that would inhibit the NS5B polymerase”).

Yet, even under respondents’ interpretation, the function at issue is only that a positively charged chemical species will increase the positive charge of a particle. A POSA reading the ‘721 patent would have clearly recognized that the inventors had possession of and enabled the full scope of this function. *See CX-0229C* (Dauskardt RWS) at Q/A 740 (“[O]ne of skill in the art would have understood that increasing the

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structure and function for the whole genus or to predict what would be covered by the functionally claimed genus. *Id.* As explained above, there is a clear correlation between structure and the level of permanent positive charge, as described in the specification, as well as a routine method of testing it.

[REDACTED]

concentration of the positively charged species in the particle could lead to increased zeta potential and permanent positive charge.”), 783 (“[A POSA] would be able to fabricate particles incorporating a wide range of positively charged nitrogen or phosphorous containing chemical species using the methods described in the ‘721 Patent.”). Unlike *Idenix*, *Wyeth* and *Amgen*, where the accused articles were not described in the patent, the Accused and DI Products have an internal chemical species that does contribute to permanent positive charge, in structures that are nearly identical to those described in the patent. *See, e.g.*, CX-0229C (Dauskardt RWS) at Q/A 728; CDX-0007C.015 (JX-0001 (‘721 Patent); JX-0213C (Optiplane)); *see also Wyeth*, 720 F.3d at 1385 (specification disclosed functional effect of a single species).

#### **v. Dependent claims 11, 13, 14, 35 and 36**

Respondents do not raise any of the written description or enablement arguments discussed above beyond those raised for the independent claims. In fact, claims 14 and 36 further limit the claims to exactly three chemical species disclosed repeatedly in the patent specification—TMAH, EOPA, or ethylenediamine—that render respondents’ written description and enablement arguments impossible to maintain against those claims. These three chemical species are each “amine compound[s]” as recited in claim 11, and each of which include “from 1 to 6 carbon atoms” as recited in dependent claims 13 and 35. Thus, claims 11, 13, 14 and 35 also have additional specific claim scope that respondents’ written description and enablement arguments cannot possibly reach.

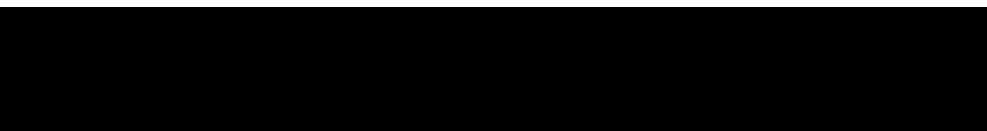
In this regard, as respondents’ expert Dr. Klein acknowledges, TMAH, EOPA, and ethylenediamine are described “as a source of internal nitrogen … [i]n a number of places throughout the patent.” Tr. 448. Dr. Klein also acknowledged that the ‘721 patent

[REDACTED]

“specifically describes a process for incorporating an alkali catalyst such as ethylenediamine, TMAH, or EOPA into the colloidal silica particles.” Tr. 450; *see also* RX-1073C (Klein WS) Q/A 70. As explained above, Dr. Klein acknowledges that Example 2 of the ‘721 patent describes working embodiments incorporating TMAH, EOPA, and ethylenediamine, respectively. *See* Tr. 452 (Dr. Klein testifying that compositions 2A and 2B “have EOPA,” 2C and 2D have “incorporated” TMAH, and 2E and 2F “have internal ethylenediamine”). Dr. Klein also acknowledged that the particles in Example 2 have a structure that would be expected to provide permanent positive charge. *See* Tr. 469–470 (testifying that the particles described in Example 2 have “nothing to wash off” when subjected to the three-step filtration process of the ‘721 patent used to determine permanent positive charge).

Dr. Klein testified that her enablement and written description positions are based on the fact that two of the species—EOPA and ethylenediamine—“don’t have enough charge to satisfy the threshold in the claim.” *See* Tr. 452–453. This position is based solely on respondents’ incorrect claim construction requiring that all of the permanent positive charge come from inside the particle. As Dr. Klein acknowledged, “the patent specification explicitly describes embodiments that have a low level of internal chemical species … [and] using surface treatment in combination with low levels of internal nitrogen or internal charge to achieve the desired levels of permanent positive charge,” Tr. 453:1–25 (describing JX-0001 (‘721 Patent) at 7:44–64):

For example, in one embodiment the colloidal silica abrasive particles may include an internal chemical species including a nitrogen-containing alkali catalyst having from 1 to 6 carbon atoms (such as the aforementioned ethylenediamine, TMAH, or EOPA). . . . In embodiments in which the colloidal silica abrasive particles include an internal nitrogen-



containing alkali catalyst having from 1 to 6 carbon atoms and are further surface treated with an aminosilane compound, the colloidal silica abrasive particles may include a low level of the internal chemical species, for example, less than 0.20 mmol/g of nitrogen. In such embodiments the zeta potential of the particles prior to the surface treatment may be less than 15 mV (e.g., less than 13 mV or less than 10 mV) at a pH of 4.

JX-0001 ('721 Patent) at 7:44–64; *see also* Tr. 454 (Dr. Klein testifying “that’s talking about embodiments having one of those three internal nitrogen species and having some external surface treatment of aminosilane.”).

Moreover, Dr. Klein acknowledged that Example 15 describes embodiments having internal EOPA and external aminosilane treatment which would be expected to provide permanent positive charge above 13 or 15 mV. *See* Tr. 455 (“[P]olishing compositions 15D, 15E, 15F, and 15G … all have internal EOPA and an external aminosilane surface treatment.”), 456 (“[T]hose zeta potential values would not decrease significantly if you were to put them through that washing step.”). The aminosilane surface treatments described throughout the '721 patent and demonstrated in Example 15 could be “used on particles with all three species described in claims 14 and 36.” Tr. 764. Indeed, Dr. Klein did not consider Example 15 in forming her opinions on written description and enablement of claims 14 and 36. *See* Tr. 470–471 (acknowledging lack of consideration of Example 15 in Dr. Klein’s single witness statement Q/A addressing written description and enablement of claims 14 and 36).

Even under respondents’ incorrect claim construction, the '721 patent discloses that TMAH, EOPA, or ethylenediamine could be incorporated internally, and that the amounts of TMAH, EOPA, or ethylenediamine could be increased to achieve desired levels of permanent positive charge. *See* CX-0229C (Dauskardt RWS) at Q/A 762–64.

[REDACTED]

Dr. Klein does not materially dispute these disclosures, and respondents have not shown a lack of written description and enablement by clear and convincing evidence.

**d. Respondents' argument regarding the "aminosilane" element of Claim 26**

Claim 26 recites “wherein an aminosilane compound is bonded with the outer surface of the colloidal silica abrasive particles.” Respondents argue that “[r]egardless of the construction, the ‘aminosilane’ limitation does not find 112 support in the ‘721 patent.” *See* Resp. Br. at 111. Respondents’ own expert, however, disagrees. Dr. Raghavan testified that “the art taught Skilled Artisans to make and use colloidal silica abrasive particles having an aminosilane compound is [sic] bonded with an outer surface of the colloidal silica abrasive particles.” *See* RX-1076C (Raghavan WS) at Q/A 546. Respondents’ own expert testimony undermines respondents’ arguments.

**i. Whether the “aminosilane” element is sufficiently disclosed**

The ‘721 patent provides extensive disclosure of an aminosilane compound bonded with the outer surface of the colloidal silica abrasive particles as in claim 26. For example, the ‘721 patent describes how “permanent positive charge may further result from a covalent interaction between the particle and a positively charged species.” *See* JX-0001 (‘721 Patent) at 11:8–13; *see also* CX-0229C (Dauskardt RWS) at Q/A 799. The ‘721 patent also describes numerous “suitable aminosilanes,” JX-0001 (‘721 Patent) at 4:11–44; CX-0229C (Dauskardt RWS) at Q/A 806, and a POSA would have understood which aminosilanes could be used to bond with silica particles. *See* Tr. 756–757 (testifying that “it would certainly be a limited scope of aminosilanes that would be

[REDACTED]

chosen” and that “one of ordinary skill in the art have understood that at the time of this patent”).

Moreover, there is no dispute that aminosilane chemistry was well understood in the art. *See* Tr. 757 (testifying that the area of aminosilane bonding was “very well understood”); RX-1073C (Klein WS) at Q/A 217 (describing “well-known condensation reaction of an Si-hydroxy and/or Si-alkoxy group with the hydroxy group on the surface of the colloidal silica.”); *see also* CX-0229C (Dauskardt RWS) at Q/A 806; *see also* CX-0229C (Dauskardt RWS) at Q/A799- 800 (explaining various examples in the ‘721 patent that incorporated aminosilane as in claim 26).

Additionally, there is no dispute that Example 15 provides a working example of CMP compositions with aminosilane bonded with the outer surface of the colloidal silica abrasive particles. *See* Tr. 456 (“[T]he aminosilane surface treatment on those particles is chemically bonded); CX-0229C (Dauskardt RWS) Q/A 800. Example 15 also demonstrates the inventors were in possession of dependent claim 37, which recites that “the aminosilane compound is bonded with less than 4% of silanol groups on the outer surface of the colloidal silica particles.” *See* CX-0229C (Dauskardt RWS) at Q/A 807. For example, the ‘721 patent describes compositions 15D–G with four different surface treatment levels: 1%, 1.5%, 2%, and 4%. JX-0001 (‘721 Patent) at 32:65–66, 33:28–31 (Table 15A). Additionally, a POSA would have been able to determine aminosilane surface coverage of colloidal silica particles fabricated according to Example 13 with reasonable certainty and would have understood Example 13 to support this claim. *See* CX-0229C (Dauskardt RWS) at Q/A 807.

[REDACTED]

Nonetheless, despite their own experts acknowledging that bonding aminosilane with colloidal silica abrasive particles was known in the art (RX-1073C (Klein WS) at Q/A 217), respondents argue that the terms “aminosilane” and “phosphonium silane” encompass “compounds having Si substituted with groups such as alkyls or aryls” and that the ‘721 patent does not convey possession of bonding these particular types of aminosilanes to silica particles. *See* Resps. Br. at 112. However, respondents have not provided evidence that a POSA would actually have considered trying to bond such aminosilanes with colloidal silica particles. *See Application of Smythe*, 480 F.2d at 1385 (reversing invalidity finding based on examples that “would be predictably inoperative in the invention and thus would never be selected by one skilled in the art”). As explained above, the ‘721 patent describes what the suitable aminosilane compounds are. *See* CX-0229C Q/A 806 (“While alkoxy silane may be the most common type of organosilane compounds, a person of ordinary skill in the art certainly would have been aware of other organosilane compounds with hydrolysable group that can also provide the same function. Afterall, silane chemistry is well understood in the art.”). Given the well understood nature of bonding aminosilane with silica particles, a POSA would have known that some aminosilanes have “features that just would not be – would not be appropriate.” *See* Tr. 756–757; CX-0229C (Dauskardt RWS) at Q/A 806.

**ii. Whether the ‘721 Patent enables the  
“aminosilane” element**

There is no dispute that the ‘721 patent enables bonding aminosilane to the outer surface of colloidal silica abrasive particles, as both parties’ experts agree that performing such bonding was well understood at the time of the ‘721 patent. *See* Dauskardt Tr. 757

(testifying that the area of aminosilane bonding was “very well understood”); RX-1073C (Klein WS) at Q/A 217 (describing “well-known condensation reaction of an Si-hydroxy and/or Si-alkoxy group with the hydroxy group on the surface of the colloidal silica.”); *see also* CX-0229C (Dauskardt RWS) at Q/A 806. Rather, respondents argue that the aminosilane elements are not enabled “to the extent construed to encompass slurries comprising [REDACTED]” *See* RX-1073C (Klein WS) at Q/A 213.

According to Dr. Klein, the ‘721 patent does not provide sufficient “direction or guidance or working examples to enable making the claimed colloidal silica particles, having both internal and external aminosilane [REDACTED].” *Id.* at Q/A 215. Dr. Klein is incorrect. For example, Example 13 and composition 10A provide detailed guidance for practicing the claims using particles with both internal and external aminosilane. *See* Dauskardt Tr. 644 (“I could give this to a member of my lab and say: Go make these particles with included EOPA, without showing them anything else”); JX-0001 (‘721 Patent) at 28:13–50 (Example 10), 30:20–43 (Example 13), 4:59–65 (“It will be understood that the colloidal silica abrasive particles may include two or more of the above described chemical species incorporated in the particles.”); CX-0229C (Dauskardt RWS) at Q/A 742–45, 762, 776. Moreover, as Dr. Grumbine testified, [REDACTED] [REDACTED] described in Example 13. *See* CX-0006C (Dauskardt WS) at Q/A 537–44; CX-0227C (Grumbine RWS) Q/A 30.

Further, respondents’ arguments are irrelevant because claim 26 does not require colloidal silica particles having both internal and external aminosilane [REDACTED] [REDACTED]. Claim 26 is met with any internal nitrogen or phosphorous containing compound

combined with surface bonded aminosilane. JX-0001 ('721 Patent) at 41:49–62. As explained above, Dr. Klein admits that the '721 patent describes methods for fabricating particles incorporating internal nitrogen containing compounds, including EOPA, [REDACTED]

[REDACTED]. See e.g., Tr. 449–450 (Dr. Klein testifying that the '721 patent specifically describes a process for incorporating an alkali catalyst such as ... EOPA).

It is also not disputed that the '721 patent provides guidance and working examples using surface bonded aminosilane to achieve desired levels of permanent positive charge. See e.g., Tr. 456 (acknowledging that the aminosilane surface treatment described in Example 15 would be expected to provide permanent positive charge); 763 (Dauskardt testifying a POSA could easily replicate examples); JX-0001 ('721 Patent) at 4:11–44, 7:33–37, 11:8–14, 11:45–48, 18:23–27, 28:12–53 (Example 10), 32:36–33:35 (Example 15); CX-0229C (Dauskardt RWS) at Q/A 799–800, 806. Indeed, even disregarding the '721 patent's clear disclosures regarding the combination of internal and external aminosilane, the patent describes multiple methods for fabricating particles that practice claim 26. See *Invitrogen*, 429 F.3d at 1071 (“[T]he enablement requirement is met if the description enables any mode of making and using the invention.”); *McRO*, 959 F.3d at 1100 (“Section 112 requires enablement of ‘only the claimed invention’”); *Vasudevan*, 782 F.3d at 684 (“Title 35 does not require that a patent disclosure enable one of ordinary skill in the art to make and use a perfected, commercially viable embodiment.”).

For at least the reasons explained above with regard to claim 26, the '721 patent also fully enables dependent claim 37, which depends directly from claim 26 and adds

[REDACTED]

the limitation that “the aminosilane compound is bonded with less than 4% of silanol groups on the outer surface of the colloidal silica particles.” *See CX-0229C (Dauskardt RWS) at Q/A 807.* The additional limitation of claim 37 is also enabled by the ‘721 patent specification, which describes preparing surface treated colloidal silica particles “by adding varying amounts of 1% APTMS to water [wherein] the amount of APTMS was calculated as a percentage of the number of silanols on the surface of 525 g of the precursor particle (105 g SiO<sub>2</sub>, 110 m<sup>2</sup>/g BET surface area), assuming 4.5 SiOH/nm<sup>2</sup>.<sup>10</sup>” JX-0001 (‘721 Patent) at 32:57–65; *see also CX-0229C (Dauskardt RWS) at Q/A 807.*

In view of the above a POSA would have been able to practice the “aminosilane” limitation in every claim in which it appears without undue experimentation.

Accordingly, respondents have not shown a lack of enablement by clear and convincing evidence.

**e. The Staff’s Section 112 Arguments Under the Preamble**

The Staff’s arguments under Section 112 differ from respondents’ arguments, and flow directly from the Staff’s construction of the claim preamble, addressed in the claim construction section of this ID. *See Section IV.A.4 (“A chemical mechanical polishing composition comprising”), supra.*

**i. The Staff’s Written Description Arguments**

**The Full Range of “Chemical Species” - Claims 1 and 26**

The Staff concludes that the “chemical species” limitation lacks adequate written description because the ‘721 patent allegedly does not describe the “full range” of chemical species that “achiev[es] the claimed permanent positive charge values and/or

[REDACTED]

CMP performance.” *See* Staff Br. at 102. The core of the Staff’s argument is that the ‘721 patent does not indicate a “clear pattern correlating” the level of internal chemical species to the level of “zeta potential” of the particle or the level of “removal rate” of the resulting CMP slurry. *See* Staff Br. at 104. This argument is not supported.

First, the Staff’s arguments distance the written description inquiry from the claims. The Staff’s “dual functional requirements” are not limitations in claims 1 or 26. Nor are the concepts of “CMP performance,” “level[s]” of internal chemical species, “removal rate,” or their alleged “correlat[ions].” Moreover, the claimed “permanent positive charge” is no more a functional requirement than weight, length, thickness, or any other property of a material. *See* Section IV.D.3.c (Respondents’ Section 112 arguments regarding the “chemical species” limitation), *supra*. In short, the Staff argues that a written description should detail descriptions of unclaimed “levels” of chemical species, unnamed additives, removal rates, and performance that would be “desired” in various polishing applications. *See* Staff Br. at 103. None of this is a requirement of the claim, and therefore not required by Section 112. *Amgen*, 314 F.3d at 1333 (“Under our precedent the patentee need only describe the invention as claimed....”).

Second, under the Staff’s interpretation of the claims, the evidence shows that any incorporation of internal “chemical species” has a predictable correlation to increased zeta potential and CMP performance. This is disclosed in the ‘721 patent (*see* JX-0001 (‘721 Patent) at 11:6–8 (“A permanent positive charge may be the result of incorporating the positive charged species in the particle.”)) and by both private parties’ technical experts. For example, respondents’ expert Dr. Raghavan opines that a POSA would recognize that internal chemical species “have positive zeta potentials known to be useful

[REDACTED]

for CMP applications.” RX-1076C (Raghavan WS) at Q/A 545; *see also id.* at Q/A 562 (summarizing the benefits of “[h]igher zeta potential” and concluding “[i]n view of at least these teachings, a POSA would have been motivated, with a reasonable expectation of success, to undertake experiments and/or otherwise determine the optimum or workable nitrogen content of a colloidal silica abrasive particle...”). CMC’s expert Dr. Dauskardt explained that the same correlation is reflected in Example 2 of the ‘721 patent—which “was really to show that the inventors were able to put nitrogen into the particles and that that correlated with higher removal rates.” *See* Dauskardt Tr. 727, 761 (even “low level” of chemical species leads to a zeta potential of “5 or 10” mV).

In this regard, the Staff lacks support for its argument that the ‘721 patent does not describe “significant portions” of the “structurally-**diverse**” and “broad genus” of internal chemical species. *See* Staff Br. at 109. The inventors identified suitable internal chemical species by common chemical formulas and well-known chemical names, including “amine containing compound[s],” “ammonium containing compound[s],” “phosphine containing compound[s],” or “phosphonium containing compound[s].” *See* JX-0001 (‘721 Patent) at 3:23–37. A POSA would have recognized the essential structural features of those types of compounds, and would have understood the “common sense” bounds pointing to “something that would be similar, that was similar to those described and disclosed.” *See* Dauskardt Tr. 631–632 (discussing aminosilane chemical species in Example 13).

Each of the disclosed species is structurally similar, having positive charge (positively charged chemical formulas) and the ability to incorporate internal to a colloidal silica abrasive particle, and thus increasing zeta potential. *See* JX-0001 (‘721

[REDACTED]

Patent) at 4:42–7:55 (describing several known methods that could be used to incorporate all of the described chemical species); CX-0229C (Dauskardt RWS) at Q/A 789 (testifying that a POSA would have expected “compounds with similar chemical structure to the exemplary nitrogen containing compounds in the ‘721 Patent’s working examples to produce colloidal silica particles with similar characteristics”). Such relevant identifying characteristics provide sufficient written description to a POSA. *See GlaxoSmithKline*, 744 F.3d at 731 (“The claim term and its corresponding description, however broad, identify certain structures produced by certain processes. We have not required more for an adequate written description that matches claim scope.”).

Third, the case law cited by the Staff highlights the sufficiency of the ‘721 patent disclosures. *See* Staff Br. at 109 (citing *AbbVie*, *Synthes*, and *Boston Scientific*). Those cases each involved accused products that fell within the scope of the asserted claims but were structurally different from anything disclosed in the patent, making it unclear whether the inventors possessed the invention reflected in the accused products.<sup>47</sup> *See*,

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<sup>47</sup> The Staff’s argument that “there is no legal basis for applying distinct legal standards to different statutory classes of patented subject matter” is not persuasive. *See* Staff Br. at 131. The Federal Circuit has recognized that functionally defined claims “pose high[er] hurdles in fulfilling the enablement requirement,” *Amgen Inc. v. Sanofi, Aventisub LLC*, No. 2020-1074, 2021 WL 501114, at \*4 (Fed. Cir. Feb. 11, 2021), than structurally defined claims. *GlaxoSmithKline*, 744 F.3d at 731. The pharmaceutical cases cited by Staff involved claims with broad functional scope, which were invalidated on that basis. *See Enzo Life Scis., Inc. v. Roche Molecular Sys., Inc.*, 928 F.3d 1340, 1346 (Fed. Cir. 2019), cert. denied, 140 S. Ct. 2634, 206 L. Ed. 2d 513 (2020) (“[T]he asserted claims here require not just a particular structure, but a particular functionality”); *Promega Corp. v. Life Techs. Corp.*, 773 F.3d 1338, 1343 (Fed. Cir. 2014) (finding claim reciting “loci which can be co-amplified” non-enabled where “[t]here [was] no genuine dispute that identifying STR loci multiplexes that will successfully co-amplify is a complex and unpredictable challenge”); *In re Vaeck*, 947 F.2d 488, 490, 95 (Fed. Cir. 1991) (finding claims to a “gene capable of being expressed in Cyanobacteria cells” non-enabled); *In re Sichert*, 566 F.2d 1154, 1162 (C.C.P.A. 1977) (finding claims non-

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e.g., *AbbVie*, 759 F.3d at 1299–1301 (finding that the accused product fell within scope of functional claims but was not disclosed in specification and patent holder’s expert conceded that the patents “do not disclose structural features common to the members of the claimed genus”); *Synthes USA, LLC v. Spinal Kinetics, Inc.*, 734 F.3d 1332, 1342–43 (Fed. Cir. 2013) (finding that accused spinal prosthetic product was structurally different from any of the configurations disclosed in the specification); *Boston Scientific Corp. v. Johnson & Johnson*, 647 F.3d 1353, 1363–1364 (Fed. Cir. 2011) (claim covered species used in the accused product but specification contained “virtually no information” about that species and contained no “structure, formula, [or] chemical name” describing the genus).<sup>48</sup>

Those issues do not apply here. Respondents’ Accused Products use the same internal chemical species (EOPA) described in multiple examples of the ‘721 patent, and are coupled with aminosilane surface treatment—again, just as in the patent examples.

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enabled where “there [was] no evidence showing that one skilled in the art would know what ingredients … would favorably affect cellular respiration.”).

<sup>48</sup> The Staff’s brief cites other cases. See, e.g., Staff Br. at 98–101 (table of cases). These cases are distinguishable for the same reasons. See, e.g., *Idenix*, 941 F.3d at 1155 (claims directed to method for treatment of hepatitis C covered the accused product, even though that structure was not disclosed or enabled in the specification); *Wyeth*, 720 F.3d at 1383 (claims directed to method for treating restenosis covered accused product, even though structure was not disclosed or enabled by the specification); *Centocor Ortho Biotech v. Abbott Labs.*, 636 F.3d 1341, 1349–50 (Fed. Cir. 2011) (accused product was “fully human antibody” but the specification contained very little description of such an antibody); *Novozymes A/S v. DuPont Nutrition Biosciences APS*, 723 F.3d 1336, 1341 (Fed. Cir. 2013) (after learning of accused product, patentee filed continuation application with claims directed specifically to it, but specification “never presented [the claimed sequence] in any particular embodiment and did not highlight the [claimed sequence] among the other disclosed options”); *Promega*, 773 F.3d at 1348–49 (patentee argued for purposes of infringement that “any and all co-amplifying loci combinations … are encompassed by the claims …”).

[REDACTED]

*See CX-0229C (Dauskardt RWS) at Q/A 728 (Examples 2, 13, and 15 have the same chemical species as the Accused Products and examples 13 and 15 have aminosilane surface treatment). Indeed, the Staff did not present evidence of any actual composition with a structurally distinct chemical species that falls within the claim but is not described in the ‘721 patent, which would address the core concern of the written description requirement. *Amgen*, 314 F.3d at 1330 (“The purpose of the written description requirement is to prevent an applicant from later asserting that he invented that which he did not”).*

The only species the Staff questions are those containing phosphorous because they are not disclosed in the working examples. *See* Staff Br. at 126. The only evidence on this point shows that phosphorous species would work because they have common structural features with those species used in the examples, including positive charge and the ability to incorporate in the claimed particles. *See CX-0229C (Dauskardt RWS) at Q/A 772 (the patent examples “further demonstrate the ‘721 patent’s teachings that...phosphorous containing species can be incorporate inside colloidal silica abrasive particles to achieve positive charge”); CX-0227C (Grumbine RWS) at Q/A 37 (“the same methodologies” to incorporate an internal chemical species “could be used for both nitrogen-and phosphorous-containing species”); see also Falko-Gunter, 448 F.3d 1357, 1366 (Fed. Cir. 2006) (“[I]t is clear that the absence of examples involving poxviruses in the Inglis applications does not render the written description inadequate.”).*

Finally, the Staff’s argument that the ‘721 patent lacks a “clear correlation between internal nitrogen levels, zeta potential, and CMP removal rates” (Staff Br. at 106, 109) appears to be based on a misunderstanding of the patent examples. With

[REDACTED]

respect to Example 2, the Staff compares nitrogen levels, zeta potential, and CMP removal rates across different slurries with different formulations. *See* Dauskardt Tr. 729 (“And, again, this is a very different slurry. It’s high concentration of colloidal silica...different conductivity. Much bigger particle size, almost three times the size. So it’s just a very different slurry.”).

The Staff also argues that the “highest” and “lowest” internal nitrogen levels do not track with higher and lower zeta potentials. *See* Staff Br. at 105. The Staff again cites numbers across different compositions with different internal chemical species. *Id.* (comparing composition 2B, made from EOPA, and 2C, made from TMAH). Yet, when addressing compositions made with the same chemical species, the specification shows a clear correlation between nitrogen concentration and zeta potential. *See* CDX-0007C.022 (CX-0229C (Dauskardt RWS) at Q/A 764; JX-0001 ('721 Patent) at 20:48–53, Table 2 (trend of increased nitrogen levels and zeta potential shown within compositions 2A and 2B, made from EOPA, and compositions 2C and 2D, made from TMAH)).

Likewise, the Staff misinterprets Example 6, and finds significance in the different compositions having different zeta potentials and different removal rates. *See* Staff Br. at 105-06. The purpose of Example 6 is to show the impact of a different feature—conductivity—a characteristic of a CMP composition separately recited in a dependent claim. *See* JX-0001 ('721 Patent) 24:62–67 (“As is apparent from the results set forth in Table 6B, high TEOS removal rates were obtained for polishing compositions having a low electrical conductivity...”); claim 17 (reciting conductivity below a certain threshold). Given the guidance in the '721 patent, a POSA would have understood the compositions in Example 6 to teach how to practice claim 17, not that claims 1 and 26 are

[REDACTED]

unpredictable. *See CX-0229C* (Dauskardt RWS) at Q/A 779–80 (testifying that a POSA would not have understood Example 6 to show “purported ‘unpredictable variability’”).

The Staff also relies on “Control 1” and “Control 2” in Example 2 (non-inventive comparators) as causing confusion because they have high zeta potentials but low removal rates (Control 2) or high removal rates and low nitrogen levels (Control 1), and Control 10C in Example 10 as showing that “external surface treatment is not guaranteed to yield particles having ‘permanent positive charge’ values” in the claimed range. *See* Staff Br. at 105 (Control 2), 107–08 (Control 10C); Dauskardt Tr. 728 (Control 1). One of ordinary skill, however, would reach a different conclusion. Controls 1 and 2 are identified as non-inventive because they are similar to problematic prior art compositions from which the ‘721 patent expressly teaches away. *See JX-0001* (‘721 Patent) at 20:65–21:2 and 5:10–16 (Compositions like Control 2 have surface treatment, but not internal charge, result in “abrasive” particles that “may not always have some of the same desirable properties as untreated silica abrasive.”); 20:64 and 15:26–32 (Control 1 is Semisperse 25—a traditional alkaline slurry with high weight percent); *see also* Dauskardt Tr. 729 (“And, again, [Control 1] is a very different slurry.”).

Likewise, Control 10C “was actually included to show that, if you only surface associate and not strongly associate a base catalyst, the TBAH, then, in fact you don’t have a charge that’s permanent. So it was put there to demonstrate exactly what is not a permanent positive charge.” Dauskardt Tr. 764; *see also JX-0001* (‘721 Patent) at 28:53–56 (describing 10C as having a “positive charge” that was “not permanent”), 33:3–4 (describing TBAH as “surface associated”). There is no dispute that POSAs understand the difference between TBAH association in Control 10C and the claimed permanent

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aminosilane bonding. Dauskardt Tr. 757 (“the area of aminosilane bonding” is “[v]ery well understood”), 762–763 (testifying that there would be “complete confidence” that a POSA could replicate the covalent aminosilane bonding in the patent); RX-1076 (Raghavan WS) at Q/A 546 (“Skilled Artisans” would understand that “having an aminosilane compound” “bonded with an outer surface of the colloidal silica abrasive particles” “exhibit a more positive zeta potential”).

**The Full Range of “Chemical Species” - Claims 11, 13, 14, 35, 36**

As discussed above, dependent claims 11, 13, 14, 35, and 36 significantly limit the “chemical species” to certain nitrogen-containing species fully represented by the examples in the specification. *See* Section IV.D.3.c.v (Dependent claims 11, 13, 14, 35 and 36), *supra*. The Staff acknowledges that claims 14 and 36 “narrowly restrict the recited ‘chemical species’ to only three possible nitrogen-containing catalysts.” *See* Staff Br. at 110. Nonetheless, the Staff argues that all of claims 11, 13, 14, 35, and 36 lack adequate written description because (a) “Table 2 illustrates the inventors’ failure to prepare a polishing composition containing internally-incorporated ethylenediamine having the recited ‘permanent positive charge’ values”; and (b) citing control Example 10C, “Table 10 shows that external surface treatment does not reliably result in a ‘permanent positive charge’ exceeding the minimum 13 mV/15mV cutoff values.” *See* Staff Br. at 110. As explained at the hearing, these conclusions appear to be based on a misinterpretation of Tables 2 and 10.

Regarding the first point, as discussed above, the ‘721 patent discloses achieving permanent positive charge greater than 15 mV with each of the particles in Table 2, including ethylenediamine. *See* CX-0229C (Dauskardt RWS) at Q/A 763 (explaining

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that Table 2 shows the zeta potential of particles with an internal species, but without a surface treatment). For example, as Dr. Dauskardt explained, Table 2 has to be read in conjunction with Examples 13 and 15. In Examples 13 and 15, an aminosilane surface treatment was added to finish the particles and so “with the internal charge and the surface treatment, the inventors clearly showed that you could easily achieve the permanent positive charge values.” Tr. 760. As Dr. Dauskardt confirmed, the disclosed aminosilane surface treatment, could “absolutely” be used for all three species recited in Table 2 and claims 14 and 36. Dauskardt Tr. 759–760, 764; *see also* CX-0229C (Dauskardt RWS) at Q/A 763 (“Returning to ethylenediamine, for example, a person of ordinary skill would have understood that particles incorporating internal ethylenediamine could be further surface treated to achieve desired levels of permanent positive charge.”).

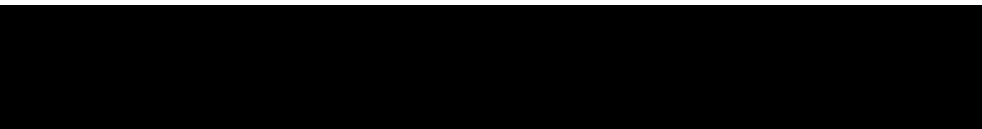
Regarding the Staff’s second point, as explained above, Control 10C does not convey unpredictability of “external surface treatment”—it actually conveys predictability because it uses a non-permanent surface treatment (TBAH) as a comparator to the invention and “was put there to demonstrate exactly what is not a permanent positive charge.” Dauskardt Tr. 764; JX-0001 (‘721 Patent) at 28:24–25 (composition 10C included TBAH “associated with the particle surface” not bonded).

By contrast, there is no dispute that the ‘721 patent discloses inventive examples using permanent surface treatment (covalently-bound aminosilane). *See* JX-0001 (‘721 Patent) at 11:8–9 (“A permanent positive charge may further result from a covalent interaction between the particle and a positively charged species...”), 11:45–48 (“Components that...are strongly associated (e.g., covalently bonded) with the particle

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surface remain with the particle...”), 28:50–52 (aminosilane surface treatment leads to “permanent positive charge); Dauskardt Tr. 732 (covalent bonding can be “done with precision” if “you’re following a standard surface procedure that’s intended to bond a silane coupling agent like an aminosilane to the surface of the particles”), 757 (a POSA would know with “certainty” the procedures to follow to make covalent bonds permanent), 762–763 (Example 15 “[a]bsolutely” describes a procedure for creating “permanent covalent bonds” and a POSA could replicate the procedure without problems); Raghavan Tr. at 541 (“chemistry of binding an aminosilane to hydroxyl groups on a silica surface is one point, very well-known...it is well known that when you have a covalent bond, it is not going to break”).

*Merck Sharp*, cited by the Staff, is not relevant to these facts. *See* Staff Br. at 113 (citing *Merck Sharp & Dohme Corp. v. Microspherix LLC* 814 F. App’x 575, 580 (Fed. Cir. 2020)). In *Merck Sharp*, the court concluded that prior art was not entitled to the benefit of the filing date of its provisional application because one of the claimed options was “absent from the provisional.” By contrast, the ‘721 patent expressly discloses the use of ethylenediamine and the use of aminosilane surface treatment to provide a permanent positive charge greater than 15 mV. *See, e.g.*, JX-0001 (‘721 Patent) at 7:43–64). That is more than sufficient to show the inventors possessed what is claimed. *See Endo Pharm. Inc. v. Teva Pharm. USA, Inc.*, 731 F. App’x 962, 973 (Fed. Cir.), vacated in part, 729 F. App’x 936 (Fed. Cir. 2018) (“Nothing in our controlling precedent requires patent owners to test release rates for each dosage level before claiming such rates in the patents. Accordingly, the inventors chose ranges encompassing the invention while allowing for variations, as the court correctly noted.”).



**“Chemical Additives”**

The Staff also argues that claims 1 and 26 are invalid because the inventors did not possess “CMP compositions containing the full range of chemical additives identified in the specification as possible components of the slurry.” *See* Staff Br. at 102. Importantly, claims 1 and 26 do not actually recite “chemical additives,” which are repeatedly described as “optional” in the ‘721 patent. JX-0001 (‘721 Patent) at 10:29 (“optional chemical additives”); *id.* at *e.g.*, 6:1–6, 12:40, 12:57, 13:21, 14:5, 14:23–24, 14:31, 39:15. Indeed, the ‘721 patent makes clear that different chemical additives are used in different circumstances and for different reasons. *See e.g., id.* at 25:14–15 (working example with acetic acid buffer and biocide), 26:1–2 (working example demonstrating the “effect of various polycarboxylic acids and a polyphosphonic acid additives on the TEOS and SiN polishing rates), 37:3–4 (acetic acid buffer and biocide)). Nonetheless, the Staff argues the claims lack an adequate written description under the theory that every possible alternative and combination of optional (and unclaimed) chemical additives should be described in the ‘721 patent.<sup>49</sup>

The law does not support this conclusion. *See Cordis Corp. v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1365 (Fed. Cir. 2003) (“As our case law makes clear, however, ‘[a]n applicant is not required to describe in the specification every conceivable and possible future embodiment of his invention.’”) (citations omitted); *Lochner Techs., LLC v. Vizio, Inc.*, 567 F. App’x 931, 938–39 (Fed. Cir. 2014) (rejecting argument that open-ended term “including” required patentees to disclose recited as well as unrecited elements).

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<sup>49</sup> The full range of chemical additives is not required under the correct claim construction of claim term “a chemical mechanical polishing composition comprising,” as discussed in Section IV.A.4, *supra*.

[REDACTED]

Similarly, here, the ‘721 patent expressly states that chemical additives are optional, not required, and the patent has multiple working examples of multiple known additives. See JX-0001 (‘721 Patent) at 10:29 (“optional chemical additives”), 25:14–15 and 37:3–4 (acetic acid buffer and biocide), 26:1–2 (different acid additives).

Finally, even under the Staff’s proposed interpretation of the claims, there is no dispute that the full range of chemical additives was already known and available. “The written description ‘need not include information that is already known and available to the experienced public.’” *Zoltek Corp. v. United States*, 815 F.3d 1302, 1308 (Fed. Cir. 2016) (citations omitted). For example, CMC’s expert Dr. Dauskardt testified that such additives were “well-known in the field” and would have had “well-defined ranges and well-understood ranges” and “predictable results.” Dauskardt Tr. 707 (“In real manufacturing situations, there would be other components to a slurry that would be very well-known in the field.”), 724 (“If ...you’re making these additions according to the well-defined ranges and well-understood ranges of how much surfactants you were to apply or how much biocide, you would have predictable results.”). Respondents’ expert likewise testified that adding chemical additives like “silicon nitrogen polishing accelerators, would have required no more than routine optimization for a Skilled Artisan” (*see* RX-1076C (Raghavan WS) at Q/A 660) and that “chelating or complexing agents” were known and that “[t]he art further taught Skilled Artisans to optimize properties and formulation of CMP compositions used in methods of polishing substrates, such as silicon oxygen and silicon nitride.” *Id.* at Q/A 728, 735.

#### **Whether “Substrates” are adequately described**

The Staff argues that the ‘721 patent’s disclosure of several potential applications

[REDACTED]

for which the claimed CMP composition “may be utilized” requires all the claims to cover any of these potential uses. *See Staff Br.* at 118 (citing JX-0001 (‘721 Patent) at 39:1–19). Claims 1 and 26 are composition claims, and “[t]he scope of these composition claims cannot...embrace only certain uses of that composition.” *Union Oil Co. of California v. Atl. Richfield Co.*, 208 F.3d 989, 995 (Fed. Cir. 2000). “Otherwise these composition claims would mutate into method claims.” *Id.* Under the Staff’s reasoning, a patentee would risk a finding of invalidity by disclosing potential uses for the invention, undermining a critical purpose of the written description requirement.

In short, these composition claims do not require any specific use of the invention, and “the patentee need only describe the invention as claimed.” *Amgen*, 314 F.3d at 1333. The *AbbVie* case cited by the Staff does not “closely resemble” these facts. *See Staff Br.* at 119. In *AbbVie*, the claims involved a “class of human antibodies that are defined by their high affinity and neutralizing activity” to a “known antigen.” *AbbVie*, 759 F.3d at 1299. The issue was whether the patent described all of the various antibodies falling in that claimed genus. *Id.* at 1300. The Court did not consider or require that the patent describe every unclaimed application in which the antibodies could be used, as the Staff suggests here.

Moreover, the factual basis for the Staff’s argument is not clear. If the Staff is interpreting the claims to require the invention to be useful for different substrates, the ‘721 patent does so. The patent, for example, describes well-known chemistries that can be used to adjust slurries to different applications. *See e.g.*, JX-0001 (‘721 Patent) at 1:54–64 (“Chemical-mechanical polishing compositions and methods for polishing (or planarizing) the surface of a substrate are well known in the art” including for dielectrics

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and “metal layers (such as tungsten or copper),” which “commonly include” “various chemical accelerators, such as oxidizers, chelating agents, catalysts, and the like”), 25:1–61 (describing formulations for polishing TEOS and silicon nitride substrates). CMC’s expert Dr. Dauskardt confirmed that a POSA would have known common formulations to make the inventive CMP slurry useful for these different applications. Dauskardt Tr. 742 (“it is possible to use the same essential mechanism of action of the – the slurry, and add known packages to allow planarization of different materials.”). The Staff’s own extrinsic evidence establishes that a POSA would expect slurries to be “substrate-specific.” *See* Staff Br. at 114–15.

## ii. The Staff’s Enablement Arguments

The Staff concludes that the same alleged limitations—“(1) internal ‘chemical specie(s) [sic]; (2) ‘chemical additive(s)’; and (3) target substrate(s)”—also lack an enabling disclosure because, according to the Staff, the ‘721 patent does not show how to “successfully combine[]” “**multiple** result-effective variables (e.g., internal chemical species and chemical additives)” for “**multiple** end-uses or applications (e.g., substantially any target substrates).” *See* Staff Br. at 125, 129. These “multiple result-effective variables” and “multiple end-uses or applications” are not recited in the asserted independent claims.

The Staff relies on its proposed construction of the preamble to import into the claims the very limitations that the Staff finds not enabled. If these additional limitations are not added to the claims through the Staff’s preamble construction, the Staff’s non-enablement argument need not be considered, as “it is the claimed invention for which

[REDACTED]

enablement is required.” *W.L. Gore & Assocs., Inc. v. Garlock, Ina*, 721 F.2d 1540, 1557 (Fed. Cir. 1983). Nonetheless, the Staff’s enablement arguments are discussed below.

Even applying the Staff’s preamble construction, the Staff’s enablement arguments are contrary to law and the evidence.<sup>50</sup> First, the Federal Circuit has repeatedly rejected the assertion that a claimed composition must be enabled across all potential “end-uses or applications (e.g., substantially any target substrates)” for that composition. *See* Staff Br. at 129. Rather, “[t]he enablement requirement is met if the description enables any mode of making and using the invention.” *Edwards Lifesciences AG v. CoreValve, Inc.*, 699 F.3d 1305, 1309 (Fed. Cir. 2012); *see also CFMT, Inc. v. Yieldup Int’l Corp.*, 349 F.3d 1333, 1338 (Fed. Cir. 2003) (absent a specific claim limitation imposing a level of performance, inquiry is whether the claim “enable[s] a person of skill in the art to make and use a system or apparatus to achieve any level” of performance without undue experimentation). As the Federal Circuit has recognized, if Section 112 required inventors to prove utility across each potential application of their inventive composition, the associated costs could prevent inventors from seeking patent protection on new and useful inventions at all. *See In re Brana*, 51 F.3d 1560, 1568 (Fed. Cir. 1995) (experiments on animals sufficient to meet enablement requirement even if intended use is for humans).

The compositions of the independent claims (in contrast to dependent method claims) are not limited in any way by use on a particular type of substrate, let alone a requirement that they are useful for substantially all substrates, as the Staff appears to

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<sup>50</sup> The Staff does not address enablement of the significantly narrower dependent claims 11, 13, 14, 35, and 36.

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argue. *Cf.* JX-0001 ('721 Patent) at claims 39–46 (dependent method claims requiring use of claimed composition for “silicon oxide” and “silicon nitride” substrates), 39:5–19 (describing substrates for which the claimed composition “may also be utilized”). It is undisputed that the numerous working examples demonstrate the claimed invention can be used for multiple substrates. *See e.g., id.* at 27:39–40 (polishing “TEOS” and “SiN”). Requiring anything more “set[s] the enablement bar too high.” *CFMT*, 349 F.3d at 1338.

Second, the Staff’s factual conclusions about the level of experimentation and predictability necessary to practice the claims appear to be based on the Staff’s own review of general textbook discussions of CMP. *See, e.g.*, Staff Br. at 128-29. Based on this research, the Staff argues that adding the optional chemical additives identified in the ‘721 patent—including “oxidizers, accelerators, catalysts, buffers, chelating agents, corrosion inhibitors, film forming agents, surfactants, polishing uniformity additives, biocides” (JX-0001 at 6:1–5)—would unpredictably impact “permanent positive charge values while maintaining adequate CMP function.” *See* Staff Br. at 128.

The testimony of the private parties’ technical experts does not support the Staff’s argument on this point. For example, as discussed above, CMC’s expert Dr. Dauskardt testified that such additives were “well-known in the field” and would have had “well-defined” ranges and “well-understood ranges” and “predictable results.” Dauskardt Tr. 707, 724. One of respondents’ experts testified similarly about “silicon nitrogen polishing accelerators” and “chelating or complexing agents.” *See* RX-1076C (Raghavan WS) at Q/A 660 (selection of polishing accelerator additive can be done by a POSA with routine optimization), 728 (selection of chelating agents), 735 (selection of acids to control removal rate).

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This evidence highlights the misplaced reliance on *Creative Kingdom*. See Staff Br. at 128-29. In that case, the Commission addressed claims in which the “novel aspect” of the invention involved the “combination of sensors” and found that the specification “must supply the novel aspects of the invention in order to constitute adequate enablement.” *Creative Kingdoms, LLC v. Int'l Trade Comm'n*, 588 F. App'x 993, 994 (Fed. Cir. 2014). The Staff appears to argue the optional additives are novel aspects of the ‘721 patent, even when they are not claimed. See, e.g., Dauskardt Tr. 697 (chemical additives are generally optional), 723 (same).

The Staff’s reliance on *Promega* is not persuasive. In that case, the claims recited DNA testing kits comprising a set of three allegedly novel loci. *Promega Corp. v. Life Techs. Corp.*, 773 F.3d 1338, 1343 (Fed. Cir. 2014). All parties agreed that the “comprising” claims covered any loci combination containing those three loci—a construction that plaintiff advocated for purposes of infringement—and there was no genuine dispute that the resulting combinations would require undue experimentation. *Id.* at 1349. By contrast, no party but the Staff advocates adding “chemical additives” or “substrates” to the claims, and the only issue the construction is relevant to is the Staff’s own theory of invalidity (neither the Accused Products nor prior art are distinguished on the basis of chemical additives or substrates). Moreover, even under the Staff’s proposed construction, both private parties agree that a POSA would know how to incorporate these known chemical additives using known techniques. See, e.g., Dauskardt Tr. 707; RX-1076C (Raghavan WS) at Q/A 660, 728, 735.

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Third, the Staff states that the full scope of the internal chemical species is “extremely large.”<sup>51</sup> See Staff Br. at 127. As discussed above, a POSA would have understood this set of species to have “common sense” bounds, and “would use something that would be similar, that was similar to those described and disclosed.” See Dauskardt Tr. 631–632. The ‘721 patent leaves no ambiguity (to a POSA) about how each of these species could be incorporated into colloidal silica abrasive particles, describing several known processes for making the claimed structure. See CX-0229C (Dauskardt RWS) at Q/A 761 (citing ‘721 patent at 5:26–7:55; CDX-0007C.019 (CX-0229C (Dauskardt RWS) at Q/A 761; JX-0001 (‘721 Patent) at 5:42–60, 6:22–36, 6:37–45, 6:56–67, 7:9–32). As discussed above, respondents’ experts agree that these known processes could be used to practice the claims. See e.g., Raghavan Tr. 506; RX-1073C (Klein WS) Q/A 179. The Federal Circuit has found similar disclosures to use methods in the art for synthesizing inventive compositions to be enabling, even if the claims cover “hundreds of permutations.” *Pfizer*, 555 F. App’x at 966–67.

Nor is there support for the Staff’s argument that the ‘721 patent provides “little to no guidance for predicting” which internal chemical species can be used to meet the “permanent positive charge” threshold values in a “functional CMP composition.” See Staff Br. at 126. Again, the claims do not require the internal chemical species alone to provide the entire threshold amount of permanent positive charge. Moreover, as explained above, experts of both private parties agree that it would be well understood (to a POSA) that incorporating a chemical species, such as those disclosed in the

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<sup>51</sup> The Staff’s general arguments cannot apply to at least claims 11, 13, 14, 35, and 36, which significantly limit the “chemical species” to certain nitrogen-containing species fully represented by the examples in the specification, as explained above.

[REDACTED]

specification, increases zeta potential and improves performance. *See RX-1076C*

(Raghavan WS) at Q/A 545; *see also* Dauskardt Tr. 761.

For these reasons, the claims differ from those in the *Idenix* and *Wyeth* cases cited by the Staff. Those cases involved methods of treating diseases undisputedly covering “thousands” if not “millions” of chemical compounds, where the patentees conceded that the utility of each species in treating the diseases at issue was unknown before testing. *Idenix*, 941 F.3d at 1157, 1159; *see also Wyeth*, 720 F.3d at 1384–1385. By contrast, a POSA would have understood the scope of internal chemical species that could “incorporate” into “colloidal silica abrasive particles” as similar to what is expressly disclosed in the ‘721 patent, and there is no dispute among the private parties’ experts that each of these species will increase permanent positive charge when incorporated. *See, e.g.*, CX-0229C (Dauskardt RWS) at Q/A 740 (“[O]ne of skill in the art would have understood that increasing the concentration of the positively charged species in the particle could lead to increased zeta potential and permanent positive charge.”); RX-1076C (Raghavan WS) at Q/A 545 (opining that a POSA would recognize that internal chemical species “have positive zeta potentials known to be useful for CMP applications”).

The Staff also argues that the claims are not enabled because “high zeta potential” and “CMP performance do not always go hand in hand,” such as in [REDACTED]  
[REDACTED]. *See* Staff Br. at 130. The very core of the invention is the realization that zeta potential alone is insufficient to achieve performance—a different structure (with internal chemical species) was needed. *See* Dauskardt Tr. 238; CX-0004C (Dysard WS) at Q/A 22. This does not reflect unpredictability. Rather, it is the central

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distinction between the claims and the prior art, as spelled out in the ‘721 patent. *See* JX-0001 (‘721 Patent) at claims 1, 26 (chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof), 5:10–13 (“While certain benefits may be achieved when utilizing the CMP compositions including such positively charged silica abrasive particles, the use of a surface treating agent may mask (or shield) the particle surface...”).

Finally, the gaps in the Staff’s evidentiary support limit the relevance of the Staff’s *Wands* analysis. Regarding the Quantity and Experimentation, Guidance in the Specification, Working Examples, and Scope of the Claimed Invention *Wands* factors, for example, the Staff repeats the argument that the claims cover a “vast array” of possible internal chemical species, chemical additives, and potential substrates, while the working examples involve “closely-related subject matter.” *See* Staff Br. at 125–28. The Staff, however, does not identify any differences between the examples and the scope of the claims and does not analyze what would have been known, followed, and easily understood by one of ordinary skill. *See id.* The specification, in fact, “has an incredibly detailed set of examples (Dauskardt Tr. 625–626), which, as discussed above, include recipes for making particles with multiple internal chemical species and measure zeta potential and removal rates for multiple substrates and using various chemical additives. *See e.g.*, JX-0001 (‘721 Patent) at 27:39–40 (polishing “TEOS” and “SiN”), 25:14–15, 26:1–2, 37:3–4 (various additives).

The specification extends these examples to specific “suitable” chemical species, chemical additives, and substrates, of which the examples are representative. *Id.* at 6:11–13 (chemical species “may include one or more of the species described above”), 10:28–

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30 (describing “optional chemical additives to the surface of a suitable substrate to be polished”), 12:22–25 (describing “suitable pH adjusting agents and/or buffering agents”), 12:60 (“suitable poly acid”), 14:6 (“suitable biocide”), 13:4 (describing “[s]uitable poly phosphonic acids”). The Staff does not explain what is lacking in this guidance and improperly relies on an “abstract assertion of breadth” “without concrete identification of matter that is not enabled but is or may be within the claim scope.” *McRO*, 959 F.3d at 1101.

Regarding the Nature of Necessary Experimentation, Predictability in the Art, and Level of Ordinary Skill *Wands* factors, the Staff deals in generalities, for example, arguing that “CMP generally is very unpredictable and highly sensitive to multiple interrelated input variables” without explaining why this assertion is relevant to the claims other than by pointing to the Tables in the ‘721 patent, which, as explained above, the Staff appears to misinterpret. *See* Staff Br. at 126. As another example, the Staff argues unrelated “difficulties” in commercial particle “manufacturing” shows that experimentation may be undue. *See* Staff Br. at 125-26, 127. Enablement does not hinge on commercial manufacturability, especially where, as here, the Staff makes no link between manufacturing issues and the asserted claims. *CFMT*, 349 F.3d at 1336–40 (“Title 35 does not require a patent disclosure enable one of ordinary skill in the art to make and use a perfected, commercially viable embodiment absent a claim limitation to that effect.”); *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Contractors USA, Inc.*, 617 F.3d 1296, 1306–07 (Fed. Cir. 2010) (A “patent specification only must enable one of ordinary skill in the art ‘to practice the claimed invention without undue

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experimentation.’ It is not required to enable the most optimized configuration, unless this is an explicit part of the claims.”).

*CFMT*, a case not cited by the Staff, is instructive in this regard. In that case, the Court reversed a district court’s finding that that a claim directed to semiconductor wafer “cleaning” was not enabled. The lower court had interpreted the claim’s preamble to require actual “removal of contaminants” and found the inventors spent months trying to achieve that goal in a commercial setting. *CFMT*, 349 F.3d at 1337–38. The Court held that “the district court set the enablement bar too high,” as “[e]nabled does not require an inventor to meet lofty standards for success in the commercial marketplace.” *Id.* at 1338. “[W]hen an invention claims a general system to improve the cleaning process for semiconductor wafers, the disclosure enables that invention by showing improvements in the overall system.” *Id.* Where the claims state “no standard of cleaning,” the patent must only “enable a person of skill in the art to make and use a system or apparatus to achieve any level of contaminant removal without undue experimentation.” *Id.* That standard is met here. The patent contains numerous examples of working CMP slurries, and there is no evidence that a POSA would have to undertake undue experimentation to build a similar embodiment. *See id.* at 1339.

#### **4. Effective Filing Date**

Respondents argue that independent claims 1 and 26 lack written description and enablement support in the ‘100 Provisional Application. *See* Resps. Br. at 133-47.

CMC disagrees. *See* Compl. Br. at 212-18. The Staff did not brief this issue. *See* Joint Outline at 3; Joint Reply Outline at 3.

For the reasons discussed below, respondents have not shown that independent

[REDACTED]

claims 1 and 26 lack written description and enablement support in the ‘100 Provisional Application.

Each of the asserted and DI claims is entitled to an effective filing date of June 25, 2014, the filing date of Provisional Application No. 62/017,100 (“the ‘100 provisional”) (JX-0027). *See* 35 U.S.C. § 101(i); 35 U.S.C. § 119(e)(1). Respondents’ expert Dr. Klein repeats respondents’ written description and enablement arguments to conclude that the ‘100 provisional does not support the asserted and DI claims. *See, e.g.*, RX-1399C (Klein RWS) at Q/A 121. However, as discussed below, the ‘100 provisional (like the ‘721 patent) includes an enabling written description of each of the asserted and DI claims under any of the parties’ proposed claim constructions.

As an initial matter, Dr. Klein emphasizes “the revisions and additions made in the ‘721 patent,” RX-1399C (Klein RWS) at Q/A 122, but does not identify any import of those arguments. These “revisions and additions” do not alter the written description and enablement analysis explained above. Rather, like the ‘721 patent, the ‘100 provisional includes extensive disclosure conveying that the inventors invented what is recited in the asserted and DI claims and providing extensive guidance to a POSA as to how to make and use the claimed CMP compositions.

Like the ‘721 patent, the ‘100 provisional describes example composition 10A, which practices the asserted and DI claims. *See* JX-0027 (‘100 provisional) ¶¶ [0079]–[0080]; CX-0006C (Dauskardt WS) at Q/A 87–90, 98; CX-0229C (Dauskardt RWS) at Q/A 742–46, 776. The ‘100 provisional describes numerous chemical species suitable for practicing the claimed invention. *See* JX-0027 (‘100 provisional) ¶¶ [0009]–[0013]; CX-0229C (Dauskardt RWS) at Q/A 761. The ‘100 provisional describes particle

[REDACTED]

fabrication procedures for incorporating internal nitrogen or phosphorous containing chemical species, and examples, including Examples 2 and 13, demonstrating these procedures. *See* JX-0027 ('100 provisional) ¶¶ [0017]–[0022], [0059], [0088] (Example 13); CX-0006C (Dauskardt WS) at Q/A 92; CX-0229C (Dauskardt RWS) at Q/A 761.

The '100 provisional describes at least three ways to achieve permanent positive charge of greater than 13 or 15 mV using the disclosed chemical species, including (1) fabricating particles with two or more positively charged species inside the particles, *id.* ¶¶ [0014], [0080]–[0081] (Example 10), [0088] (Example 13); (2) using internally incorporated chemical species and surface treatment together, *id.* ¶¶ [0034]; and (3) controlling amount of chemical species in the particles. *Id.* ¶ [0059] (Example 2); *see also* CX-0229C (Dauskardt RWS) at Q/A 762–64. As explained above with respect to the '721 patent's overlapping disclosures, these disclosures convey possession of the claimed CMP compositions and would have enabled a POSA to practice the asserted and DI claims.

**a. Whether the '100 Provisional Describes and Enables Claims 1 and 26**

Respondents' arguments with respect the '100 provisional's support for independent claims 1 and 26 substantially overlap with their written description and enablement arguments for the '721 patent and are unpersuasive for the same reasons explained above. Dr. Klein again testified that the particle fabrication procedure described in Example 13 does not show possession of or enable colloidal silica particles containing an internal species that is not an aminosilane. RX-1399C (Klein RWS) at Q/A 128. As explained above for the '721 patent, Dr. Klein disregards the explicit

[REDACTED]

disclosures. For example, a POSA would have understood the procedure described in Example 13 to result in EOPA being incorporated in the particles. *See CX-0006C* (Dauskardt WS) at Q/A 87–90, 98; CX-0229C (Dauskardt RWS) at Q/A 742–46, 776; Dauskardt Tr. 644. Indeed, [REDACTED]

[REDACTED] and have internal EOPA. *See CX-0006C* (Dauskardt WS) at Q/A 537–44; CX-0227C (Grumbine RWS) Q/A 30; CX-0002C (Grumbine WS) Q/A 37.

Dr. Klein also repeats several additional incorrect opinions. Dr. Klein again opines in the context of the ‘100 provisional that (1) Examples 2 and 6 “show the inventors were not in possession of, and did not enable, the compositions of claim 1” (RX-1399C (Klein RWS) at Q/A 164); (2) it does not describe and enable the full scope of “colloidal silica particles having the claimed permanent positive charge but not including an aminosilane” (*id.* at Q/A 178); and (3) it “demonstrates unpredictable variability and the inability to consistently obtain even a zeta potential of at least 15 mV when incorporating non-aminosilane chemical species” (*id.* at Q/A 186).

Each of these opinions fall short for the reasons explained above in the context of the ‘721 patent specification. The ‘100 provisional describes multiple methods for achieving desired levels of permanent positive charge with a wide range of nitrogen and phosphorous containing species, and a POSA would have been able to implement these methodologies without undue experimentation. *See JX-0027* (‘100 provisional) ¶¶ [0014], [0059] (Example 2), [0080]–[0081] (Example 10), [0088] (Example 13); CX-0006C (Dauskardt WS) at Q/A 101; CX-0229C (Dauskardt RWS) at Q/A 762–64; *see also* RX-1399C (Klein RWS) Q/A 140 (acknowledging that the ‘100 provisional

[REDACTED]

describes multiple methods for “creating colloidal silica particles comprising an internal nitrogen”); *Johns Hopkins*, 152 F.3d at 1361.

Similarly, respondents repeat their incorrect arguments with respect to the aminosilane element of claim 26 and its dependents. Respondents’ expert Dr. Klein testified that Example 13 and the many examples prepared according to Example 13 “would not be understood as falling within the scope of claim 26 … and are not working examples sufficient to guide a POSA to create the claimed compositions.” RX-1399C (Klein RWS) at Q/A 208. As explained above, Dr. Klein discredits clear disclosures in the ‘100 provisional. *See* Dauskardt Tr. 643; CX-0006C (Dauskardt WS) at Q/A 90, 104–106; CX-0229C (Dauskardt RWS) at Q/A 800. Furthermore, as explained above, both the ‘721 patent and the ‘100 provisional describe how “[a] permanent positive charge may further result from a covalent interaction between the particle and a positively charged species.” *See* JX-0027 (‘100 Provisional) ¶ [0034]; CX-0006C (Dauskardt WS) at Q/A 90; CX-0229C (Dauskardt RWS) at Q/A 799.

Respondents argue that the ‘100 provisional does not describe and enable the negative limitation in claim 1—“wherein the chemical species is not an aminosilane or a phosphonium silane.” *See* Resp. Br. at 140. However, respondents’ arguments with respect to the negative limitation are incorrect, at least because respondents’ expert disregards the extensive disclosure of alternative chemical species in the ‘100 provisional. *See Inphi Corp. v. Netlist, Inc.*, 805 F.3d 1350, 1356 (Fed. Cir. 2015) (“If alternative elements are positively recited in the specification, they may be explicitly excluded in the claims.”) (quoting MPEP § 2173.05(i)). The ‘100 provisional describes numerous alternatives to aminosilane, including EOPA and TMAH. JX-0027 (‘100

[REDACTED]

provisional) ¶¶ [0009]–[0012] [0059], [0067]–[0068], [0080], [0088]; CX-0006C

(Dauskardt WS) at Q/A 89.

### **b. Dependent Claims**

Respondents make cursory arguments with respect to the extensive supporting disclosure in the ‘100 provisional for the dependent claims—improperly dismissing explicit and generally applicable disclosures in the ‘100 provisional. As discussed below, all asserted and DI claims are entitled to an effective filing date of June 25, 2014.

Claims 3, 6, 17, 19–21, 24, 27, 31, and 38 recite further properties of the polishing composition. The ‘100 provisional describes and enables each of the claim elements in combination under any parties’ proposed constructions. For example, the ‘100 provisional describes suitable buffering agents, including acetic acid and numerous others. *See* JX-0027 (‘100 provisional) ¶ [0038]; CX-0006C (Dauskardt WS) at Q/A 107. The ‘100 provisional provides numerous exemplary polishing compositions within the claimed weight percent ranges. *See, e.g.*, JX-0027 (‘100 provisional) ¶¶ [0059] (Example 2), [0067] (Example 6), [0080] (Example 10), [0089] (Example 13); CX-0006C (Dauskardt WS) at Q/A 111–12. The ‘100 provisional also describes how low electrical conductivity can be desirable for silicon dioxide (TEOS) polishing performance and includes numerous exemplary polishing compositions having conductivity of less than about 300 µS/cm. *See, e.g.*, JX-0027 (‘100 provisional) ¶¶ [0061] (Example 3), [0068] (Example 6), [0070] (Example 7), [0074] (Example 8), [0077] (Example 9); CX-0006C (Dauskardt WS) at Q/A 122, 126–27. Dr. Klein dismisses the clear disclosures supporting these claims as “picking and choosing” without further analysis. *See* RX-1399C (Klein RWS) at Q/A 230, 249.

[REDACTED]

Claims 4, 5, 7–9, 15, 16, 18, 23, 28, 29, and 32–34 recite additional properties of the colloidal silica particles: particle size (claims 4 , 5, and 29), particle aggregation (claims 7–9, and 32–24), particle core-shell structure (claims 15 and 16), particle density (claim 18), a combination of size and aggregation (claim 23), and permanent positive charge (claim 28). The ‘100 provisional describes and enables each of the claim elements in combination under any parties’ proposed constructions.

For example, the ‘100 provisional describes how to measure particle size. *See*, e.g., JX-0027 (‘100 provisional) ¶ [0028], [0059] (Example 2); [0063] (Example 4); [0076] (Example 9), [0080] (Example 10). Further, a POSA would have known to modify parameters, such as the amount of silica producing compound and reaction time, disclosed in the ‘100 provisional to achieve the desired particle sizes. *See* CX-0006C (Dauskardt WS) at Q/A 109.

With respect to claims 15 and 16, the ‘100 provisional describes a fabrication procedure for growing colloidal silica particles with a core-shell structure, and a POSA would have been able to achieve the desired outer shell thickness without undue experimentation. *See* JX-0027 (‘100 provisional) ¶[0020]; CX-0006C (Dauskardt WS) at Q/A 120.

The ‘100 provisional also describes polishing compositions having the claimed aggregation and particle sizes, and describes how to prepare colloidal silica abrasive particles with the desired level of aggregation. *See* JX-0027 (‘100 provisional) ¶¶ [0024], [0025], [0027]; CX-0006C (Dauskardt WS) at Q/A 113. Furthermore, the provisional Figure and associated description provide instruction and guidance for determining a

[REDACTED]

polishing composition's aggregate distribution using TEM images. *See JX-0027 ('100 provisional) ¶ [0026]; CX-0006C (Dauskardt WS) at Q/A 113.*

Claims 10, 11, 13, 14, 35, and 36 further describe the "chemical species." For example, claim 14 and claim 36 require that the chemical species "comprises ethyloxypropylamine, tetramethyl ammonium hydroxide, or ethylenediamine." The '100 provisional describes and enables each of the claim elements in combination under any parties' proposed constructions for the reasons explained above. *See, e.g., CX-0006C (Dauskardt WS) at Q/A 116–18.*

Claim 37 recites "the composition of claim 26, wherein the aminosilane compound is bonded with less than 4% of silanol groups on the outer surface of the colloidal silica particles." The '100 provisional describes a specific particle fabrication procedure, which a POSA would have understood to convey possession of this claim given the low amount of APTMS used, and from which a POSA would have been able to determine aminosilane surface coverage of the resultant colloidal silica particles with reasonable certainty. *See JX-0027 ('100 provisional) ¶ [0088]; CX-0006C (Dauskardt WS) at Q/A 133–35.*

Claims 39–44 and 46 recite methods for using the polishing composition in claim 1. The '100 provisional describes methods of chemical mechanical polishing a substrate using polishing compositions in accordance with the invention and provides example compositions achieving the claimed removal rates at the claimed weight percentages and downforces. *See, e.g., JX-0027 ('100 provisional) ¶¶ [0054], [0057] (composition 1C), [0059] (compositions 2C and 2D), [0068] (composition 6G); CX-0006C (Dauskardt WS) at Q/A 136–41.* The '100 provisional also describes suitable silicon nitrogen inhibitors

[REDACTED]

and example compositions achieving the removal rates for silicon oxygen and silicon nitride materials as recited in claims 44 and 46. *See, e.g.*, JX-0027 ('100 provisional) ¶¶ [0043], [0070]-[0071] (compositions 7A–C), [0076] (Example 9); CX-0006C (Dauskardt WS) at Q/A 140.

Dr. Klein opines that the express disclosures in the '100 provisional supporting these claims should be ignored because the '100 provisional discloses example compositions with performance falling outside the claimed ranges. *See* RX-1399C (Klein RWS) at Q/A 235. However, as discussed above, interpreting the example compositions as limiting is improper, and the '100 provisional provides extensive guidance for practicing the method claims with a broad range of chemical species, including ethylenediamine. *See e.g.*, CX-0229C (Dauskardt RWS) at Q/A 762.

## 5. Inventorship

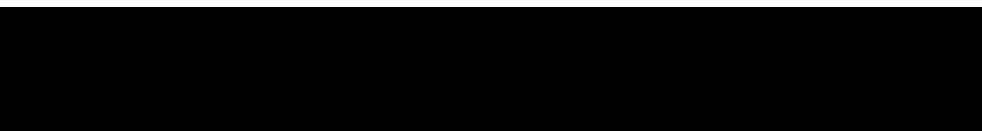
Respondents argue that the '721 patent is invalid for improper inventorship. *See* Resp. Br. at 215-26.

CMC and the Staff disagree. *See* Compl. Br. at 218-23; Staff Br. at 145-52.

For the reasons discussed below, respondents have not shown that the '721 patent is invalid for improper inventorship.

"The burden of showing misjoinder or nonjoinder of inventors is a heavy one."  
*BJ Servs. Co. v. Halliburton Energy Servs., Inc.*, 338 F.3d 1368, 1373–74 (Fed. Cir. 2003). 35 U.S.C. § 116 provides the standard for joint inventorship:

When an invention is made by two or more persons jointly, they shall apply for patent jointly and each make the required oath, except as otherwise provided in this title. Inventors may apply for a patent jointly even though (1) they did not physically work together or at the same time, (2) each did not make the same type or amount of contribution, or (3) each



did not make a contribution to the subject matter of every claim of the patent.

35 U.S.C. § 116.

Inventorship is a question of law based on underlying factual determinations.

*Vapor Point LLC v. Moorhead*, 832 F.3d 1343, 1348 (Fed. Cir. 2016).

The ‘721 patent properly names all co-inventors, and respondents have not shown otherwise by clear and convincing evidence. Importantly, the “inventors as named in an issued patent are presumed to be correct.” *Hess v. Advanced Cardiovascular Sys., Inc.*, 106 F.3d 976, 980 (Fed. Cir. 1997). Thus, the ‘burden of showing misjoinder or nonjoinder of inventors is a heavy one.’” *Id.* The definition for inventorship can be simply stated: ‘The threshold question in determining inventorship is who conceived the invention. Unless a person contributes to the conception of the invention, he is not an inventor. . . .’” MPEP §2137.01 (citing *Fiers v. Revel*, 984 F.2d 1164, 1168 (Fed. Cir. 1993)).

Dr. Klein opines that “Fuso was responsible for and contributed at least to the synthetic procedures for making colloidal silica particles on which the patent relies,” RX-1073C (Klein WS) at Q/A 223, and that “it does not appear that Cabot’s named inventors conducted, designed, developed, or controlled the processes necessary to make these particles.” *Id.* Q/A 262. However, the claim limitations do not relate to “synthetic procedures for making colloidal silica particles” or the “conduct[ing], develop[ing], or controll[ing]” of “processes necessary to make these particles.”

Rather, the claims relate to a polishing composition having colloidal silica abrasive particles with a specific structure and existing in a composition that achieves a certain level of permanent positive charge. *See JX-0001* (‘721 Patent) at 11:17, 10:48–

[REDACTED]

49; claims 1, 26; 6, 31, 40–44; CX-0004C (Dysard WS) at Q/A 30; JX-0067C (iDIEL Colloidal ILD Project Part 1) at CMC00017467, 17470 (summarizing experiments for determining optimal pH and optimal “charge”). The claims are not limited by a particular synthesis method or manufacturing process to make the structures as claimed. Respondents have not shown that anyone at Fuso contributed anything to any of the actual claim limitations. *Sewall v. Walters*, 21 F.3d 411, 416 (Fed. Cir. 1994) (“[T]he presence of Sewall’s alleged coinventive contributions, namely, the circuits that he designed, [are] completely optional to the apparatus of the count.”).

Respondents’ argument appears largely to be based on Dr. Klein’s speculation. Indeed, a key part of her analysis appears to be her review of a subset of CMC’s document production and her conclusion that nothing in those documents “describe the synthetic steps necessary to create the particles on which the ‘721 patent relies...” See RX-1073C (Klein WS) Q/A 275–77.

Yet, the actual evidence shows that Fuso did not contribute to any claim limitation and that the four named inventors were exclusively responsible for conception. Indeed, all four inventors named on the ‘721 patent testified that they were the correct and only inventors of the ‘721 patent, and [REDACTED]

[REDACTED] See CX-0002C (Grumbine WS) at Q/A 7, 11; CX-0004C (Dysard WS) at Q/A 21–36; Dysard Tr. 119 [REDACTED] [REDACTED], 120 (“Q. Did Fuso make any inventive contribution to your invention? A. No.”); JX-0419C (Shen Dep. Tr.) at 25, 69, 85, 136–137; CX-0227C (Grumbine RWS) at Q/A 26–44; CX-0228C (Dysard RWS) at Q/A 21–32.

[REDACTED]

Moreover, Fuso did not have the capability of conceiving the claimed invention because [REDACTED]  
[REDACTED]  
[REDACTED]. *See e.g.*, CX-0002C (Grumbine WS) at Q/A 11–12; CX-0004C (Dysard WS) at Q/A 21–39; CX-0227C (Grumbine RWS) at Q/A 26–27; CX-0228C (Dysard RWS) at Q/A 21–22.

As Dr. Dysard explained, he confidentially disclosed to [REDACTED]  
[REDACTED]  
[REDACTED].” *See* Tr. 120; *see also* CX-0004C (Dysard WS) at Q/A 21–30, 32; *see also* JX-0129C (Meeting Summary). He specifically provided [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]. *See* CX-0004C (Dysard WS) at Q/A 29–30; JX-0129C (Meeting Summary); Tr. 110 (testifying that CMC shared “[REDACTED]  
[REDACTED] 113 [REDACTED]  
[REDACTED]  
[REDACTED].

It was also clear to Dr. Dysard at the meeting that [REDACTED]  
[REDACTED]  
[REDACTED].” *See* Tr.

[REDACTED]

120; *see also* CX-0004C (Dysard WS) at Q/A 32. While CMC decided to [REDACTED]  
[REDACTED]  
[REDACTED] *See, e.g.*, Tr. 121 (testifying that  
CMC [REDACTED]  
[REDACTED]  
[REDACTED]

Dr. Dysard's testimony is corroborated by subsequent emails between Fuso and CMC. For example, CX-0219C (2012 Email to Fuso) and CX-0220C (CMC Spreadsheet) are a December 12, 2012, email and attachment from Dr. Grumbine to Fuso. Both describe CMC's [REDACTED]  
[REDACTED]  
[REDACTED]" *See* CX-0002C (Grumbine WS) at Q/A 14–18. Dr. Grumbine also "[REDACTED]  
[REDACTED] *Id.* at Q/A 19. Consistent with Dr. Dysard's testimony, in Fuso's response, CX-0211C (2012 Email from Fuso), Fuso said that [REDACTED]  
[REDACTED]. *See also* CX-0002C (Grumbine WS) at Q/A 22.

None of respondents' other inventorship arguments provide any proof that Fuso contributed to the invention of the '721 patent. *See* CX-0229C (Dauskardt RWS) at Q/A 653–712. The [REDACTED] JX-0111C (Agreement), does not identify the invention or any inventors. *See* CX-0229C

(Dauskardt RWS) at Q/A 666; *see also* Tr. 119 (testifying that CMC [REDACTED]  
[REDACTED]  
[REDACTED]

Contrary to Dr. Klein's opinions, the evidence shows that CMC also designed and conceived of the particles disclosed in the '721 patent and the methods for making them. *See* CX-0227C (Grumbine RWS) at Q/A 30–39; CX-0229C (Dauskardt RWS) at Q/A 693–702. Similarly, the evidence shows that any work [REDACTED] did not contribute to the '721 patent invention in any way. *See* CX-0229C (Dauskardt RWS) at Q/A 704–07, 711; *see also* Tr. 120 (Dr. Dysard: “Q. Did Fuso make any inventive contribution to your invention? A. No.”). The Fuso Japanese patent cited by Dr. Klein does not relate to the '721 patent and is a method of manufacture—irrelevant to the inventorship issue here. *See* CX-0229C (Dauskardt RWS) Q/A 708.

Additional email communications and interactions between CMC and Fuso confirm that CMC [REDACTED]. *See* CX-0216C (Email from Yoshiki Michiwaki to Steven Grumbine); CX-0217C (Email from Steven Grumbine to Yoshiki Michiwaki); CX-0213C (Email from Steven Grumbine to Yoshiki Michiwaki); CX-0214C (Email from Steven Grumbine to Yoshiki Michiwaki); CX-0212C (Email from Jeffry Dysard to Sugita Shinichi); CX-0190C (Email Correspondence); CX-0221C (Email- Dec. 10, 2013); CX-0210C (Email from Yoshiki Michiwaki to Steven Grumbine); CX-0215C (iDIEL D9225: The Evolution, Colloidal ILD Project Update, date June 19, 2014).

## **6. Inequitable Conduct**

Respondents argue that the '721 patent is unenforceable due to a pattern of active

[REDACTED]

concealment and affirmative misrepresentations. *See* Resps. Br. at 226-34.

CMC and the Staff disagree. *See* Compl. Br. at 223-28; Staff Br. at 153-54.

For the reasons discussed below, respondents have not shown that the ‘721 patent is unenforceable due to a pattern of active concealment and affirmative misrepresentations.

“To prevail on a claim of inequitable conduct, the accused infringer must prove that the patentee acted with the specific intent to deceive the PTO.” *Therasense*, 649 F.3d at 1290. “In other words, the accused infringer must prove by clear and convincing evidence that the applicant knew of the reference, knew that it was material, and made a deliberate decision to withhold it.” *Id.* “[T]o meet the clear and convincing evidence standard, the specific intent to deceive must be the single most reasonable inference able to be drawn from the evidence,” and thus, “when there are multiple reasonable inferences that may be drawn, intent to deceive cannot be found.” *Id.* at 1290-91 (citations omitted). “Intent and materiality are separate requirements,” and thus a court “may not infer intent solely from materiality. Instead, a court must weigh the evidence of intent to deceive independent of its analysis of materiality.” *Id.* at 1290. “The absence of a good faith explanation for withholding a material reference does not, by itself, prove intent to deceive.” *Id.* at 1291.

Respondents argue that CMC inventors and prosecution counsel failed to uphold their duty of candor to the PTO by failing to disclose the name of [REDACTED]

[REDACTED] *See* Resps. Br. at 226-34; EDIS Doc. ID No. 728175

(Respondents’ First Amended Response to the Complaint) at 34–36. Respondents have not shown that any of the inventors or patent agents and attorneys (respondents elected

[REDACTED]

only to depose one of several named patent agents and attorneys) understood the names PL-3C and [REDACTED] to be material to patentability or that they had an intent to deceive the PTO. *See CX-0227C* (Grumbine RWS) at Q/A 42–44; *CX-0228C* (Dysard RWS) at Q/A 33–34; *RX-0680C* (Omholte Dep. Tr.) 294–295.

First, the names of PL-3C and [REDACTED] particles are not material to patentability, and the evidence shows that the inventors did not understand this information to be material to patentability, for several reasons. As an initial matter, PL-3C and [REDACTED] are not prior art, as discussed above. *See Section IV.D.1.a.ii (Whether the Silica Particles Are Prior Art), supra.* As Dr. Grumbine testified, each particle was [REDACTED] [REDACTED] 1, and confidential at all times before filing the application that resulted in the ‘721 patent. *See CX-0002C* (Grumbine WS) at Q/A 42-44, 53–54, 56; *see also CX-0228C* (Dysard RWS) at Q/A 33-34.

[REDACTED], and both [REDACTED] and PL-3C were confidential and [REDACTED] during prosecution of the ‘721 patent. *See CX-0002C* (Grumbine WS) at Q/A 53-55; *CX-0227C* (Grumbine RWS) at Q/A 18, 19, 42-44. Likewise, PL-3C and [REDACTED] particles were designed only to have [REDACTED] [REDACTED] and thus, were not relevant to prosecution and in fact [REDACTED] in the ‘721 patent’s specification. *See CX-0002C* (Grumbine WS) at Q/A 53–55; *CX-0227C* (Grumbine RWS) at Q/A 6–19, 41-44; *CX-0229* (Dauskardt RWS) at Q/A 90, 134–152.

As Dr. Grumbine testified, the PL-3C and [REDACTED] particles were similar to those particles “used in failed designs.” *See CX-0002C* (Grumbine WS) at Q/A 53. As Dr. Dysard explained, [REDACTED]

[REDACTED]  
[REDACTED]  
[REDACTED] See Tr. 100–101. Thus, respondents have not shown that the names of either of PL-3C or [REDACTED] would have impacted the Examiner’s decisions such that the ‘721 patent would not have issued. *See CX-0229* (Dauskardt RWS) at Q/A 90, 134–36, 713–24.

In this regard, respondents argue that the inventors could not have argued that the prior art Fu reference from prosecution does not disclose particles with internal nitrogen had the inventors disclosed by name the Fuso PL-3C and [REDACTED] particles. Respondents make no arguments that Fu discloses these particles, and thus respondents could have made the very same argument. Even if those particle names were disclosed to the PTO, rather than simply describe their characteristics and structures in great detail as was done in the ‘721 patent, the inventors could have argued that these particles are not prior art and that the PL particles do not include internal nitrogen, as shown above. *See e.g.*, Tr. 519–522 (discussing respondents’ opening demonstrative (RDX.0009C at slide 64) titled “Inequitable Conduct” that is based on “highly questionable” internal and confidential testing by CMC).

Similarly, respondents have not shown the required “but-for” materiality because they have admitted that the Fuso particles do not disclose each and every element, and thus do not anticipate the claims. Respondents provide no explanation of how the examiner would have applied and used the PL-3C and [REDACTED] product names to reject claims 1 and 26. Respondents do not allege that those particles are combinable with the Fu reference applied by the examiner or any other prior art of record. Therefore, respondents have not demonstrated the requisite but-for materiality.

[REDACTED]

Second, the fact that the names of these particles were not identified does not reflect any intent to deceive. The inventors have repeatedly testified that they had no such intent and that they provided (and CMC required them to provide) all relevant information to the PTO. *See CX-0227C (Grumbine RWS)* at Q/A 42–44; CX-0228C (Dysard RWS) at Q/A 33–34. Indeed, being [REDACTED] and confidential particles, the names were highly confidential and not relevant because most people in the industry at the time would not have recognized the names “PL-3C” or [REDACTED] to refer to any particular particle. *See CX-0227C (Grumbine RWS)* at Q/A 42–44; CX-0228C (Dysard RWS) at Q/A 33–34; CX-0227C (Grumbine RWS) at Q/A 41–44; CX-0002C (Grumbine WS) at Q/A 54, 56.

In any event, the inventors did disclose extensive information about the particles’ design and structure in a way that someone reading the ‘721 patent could understand.

Specifically, using [REDACTED]

[REDACTED] in the ‘721 patent. *See CX-0002C (Grumbine WS)* at Q/A 54, 55; *see also, e.g., JX-0001 (‘721 Patent)* at 20:65 (“69 nm colloidal Stober silica having 3- (aminopropyl)trimethoxysilane associated with the particle surface”), Example 2, 10–13; CX-0227C (Grumbine RWS) at Q/A 42–44; CX-0228C (Dysard RWS) at Q/A 33–34. This conduct reflects an intent to be “as transparent as possible.” *See CX-0002C (Grumbine WS)* at Q/A 54; JX-0001 (‘721 Patent) at 20:65. The non-inventive PL-3C and [REDACTED] structures were also [REDACTED]

[REDACTED] in the ‘721 patent specification “so that a person reading the patent would know what would not work.” *See CX-0002C (Grumbine WS)* at Q/A 54; CX-0227C (Grumbine RWS) at Q/A 19, 41–44.

[REDACTED]

Respondents also argue that CMC intentionally removed reference to an internal nitrogen content of PL-3C particles from the provisional application leading to the ‘721 patent. *See* Resp. Br. at 226-30. The evidence shows otherwise. As Dr. Grumbine testified, the inventors did not, and do not, believe PL-3C particles had internal nitrogen. *See* CX-0002C (Grumbine WS) at Q/A 55; *see also* CX-0227C (Grumbine RWS) at Q/A 43. Thus, the reference in the provisional application was not “an accurate reporting of the internal nitrogen of PL-3C particles,” and “the number was very likely not included in the non-provisional application because we knew it was incorrect.” *See* CX-0002C (Grumbine WS) at Q/A 55 (further testifying that “[i]f the number related to PL-3C at all, it may have related to the nitrogen content of the external surface treatment”). Accordingly, the change from the provisional indicates efforts to correct the disclosure to the PTO, not to deceive the PTO.

Accordingly, respondents have not shown that the ‘721 patent is unenforceable due to a pattern of active concealment and affirmative misrepresentations.

## V. Domestic Industry (Economic Prong)

CMC argues, *inter alia*:

The economic prong of the domestic industry requirement is met when there exists in the United States in connection with articles practicing at least one claim of the patent-at-issue: (A) significant investment in plant and equipment; (B) significant employment of labor or capital; or (C) substantial investment in its exploitation, including engineering, R&D, or licensing. 19 U.S.C. § 1337(a)(3). Satisfaction of any one of these criteria suffices. *Certain Integrated Circuit Chipsets & Products*, Inv. No. 337-TA-428, Order No. 10 at 3 (May 4, 2000).

“DuPont does not dispute that CMC satisfied the economic prong of the domestic industry requirement.” RPreHBr at 42. Indeed, CMC satisfies all three criteria. CMC is one of the largest suppliers of consumable materials to the semiconductor industry. *See* JX-0019 (CMC



2019 Form 10-K) at 5. CMC has for decades been a pioneer in providing CMP slurry products to nearly all semiconductor manufacturers in the United States and throughout the world. *See CX-0107* (Dielectric/Advanced Dielectric CMP Polishing Slurries). To reach this position, CMC has invested significant and substantial resources in the United States to develop, produce, and support CMP slurries, including the DI Products.

Compl. Br. at 228; *see id.* at 229-39.

Respondents state that they “do not dispute that CMC satisfied the economic prong of the domestic industry requirement.” Resp. Br. at 234.

The Staff argues:

CMC has presented evidence demonstrating that the economic prong of the domestic industry requirement is satisfied in this investigation. Specifically, CMC presents evidence under each prong of 19 U.S.C. § 1337(a), demonstrating that its investments in plant and equipment, labor and capital, and exploitation of the ‘721 patent are significant and substantial. *See generally* CMC Br. at 208-27. DuPont has represented that it does not dispute CMC’s evidence satisfies the economic prong, and will not contest this issue at the hearing or thereafter. *See* DuPont Br. at 240.

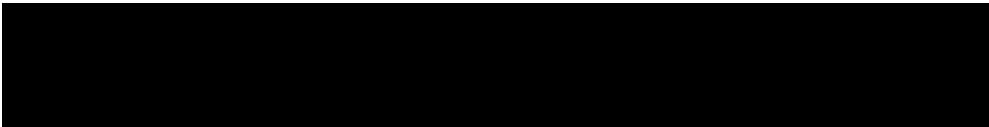
#### **A. Plant and Equipment**

CMC notes that its corporate headquarters in Aurora, IL include approximately [REDACTED] is devoted to research and development (R&D) (“870 R&D Facility”). CMC also has a manufacturing plant and distribution center in Aurora comprising approximately 170,000 square feet, known as the “845 Enterprise Facility.” CMC Br. at 210.

According to CMC, a large portion of its domestic property, plant, and equipment is focused on CMP, with a significant portion devoted to the CMP products embodying the asserted claims. Specifically, CMC will present evidence demonstrating that its total allocated investments in plant and equipment at the 870 R&D Facility, based on the percentage of experiments in the clean room on the Domestic Industry Products each year [REDACTED]

[REDACTED]; similarly, its total allocated investments at the 870 R&D Facility based on the percentage of requests in the pilot plant relating to the Domestic Industry Products each year [REDACTED]

*Id.* at 217. In view of this



evidence, and DuPont's representation that it will not contest the economic prong, the Staff agrees that CMC has shown significant investments in plant and equipment.

### **Labor and Capital**

CMC has presented evidence that it has employed and continues to employ a significant workforce at both the 845 Enterprise Facility and the 870 R&D Facility. According to CMC, the employees at the 845 Enterprise Facility perform manufacturing activities relating to the Domestic Industry Products, while employees at the 870 R&D Facility perform activities relating to, among other things, the invention and commercialization of the Domestic Industry Products.

CMC's evidence demonstrates that its total allocated investments in labor and capital at the 870 R&D Facility, based on the percentage of experiments in the clean room on the Domestic Industry Products each year, have a total value of [REDACTED] allocable to the '721 patent from 2014 through June 2020; similarly, the total allocated investments in labor and capital at the 870 R&D Facility, based on the percentage of requests in the pilot plant related to the Domestic Industry Products each year, have a total value of [REDACTED], allocable to the '721 patent from 2014 through June 2020. *Id.* at 221-22. In view of this evidence, and DuPont's representation that it will not contest the economic prong, the Staff agrees that CMC has shown sufficiently significant investments in labor and capital.

### **Investment in Exploiting the '721 Patent**

CMC's evidence shows that the '721 patent claims are directed to CMP products having specific characteristics, such that research and development directed to the Domestic Industry Products is "necessarily research and development directed to the patented technology of the '721 Patent," such that a "nexus therefore exists" between its R&D expenditures in the Domestic Industry Products and the patented technology of the '721 patent. *Id.* at 222. See *Certain Gas Spring Nailer Products & Components Thereof*, Inv. No. 337-TA-1082, Comm'n Op. at 80 (Apr. 28, 2020) (nexus exists when activities relate to developing DI products embodying patent-in-suit).

CMC's evidence demonstrates that its total allocated investments at the 870 R&D facility based on the percentage of experiments in the clean room relating to the Domestic Industry Products each year have a total value of [REDACTED] from 2014 through June 2020; similarly, its total allocated investments at the 870 R&D Facility based on the percentage of requests in the pilot plant relating to the Domestic Industry



Products have a total value of [REDACTED] from 2014 through June 2020. See CMC Br. at 222-23. In view of this evidence, and DuPont's representation that it will not contest the economic prong, the Staff agrees that CMC has shown sufficiently significant investments in exploiting the '721 patent.

#### **CMC's Total Domestic Investments in the '721 Patent**

CMC's total allocated investments at the 870 R&D Facility based on the percentage of clean room experiments relating to the Domestic Industry Products each year have a total value of [REDACTED] from 2014 through June 2020; its total allocated investments at the 870 R&D Facility based on the percentage of requests in the pilot plant relating to the Domestic Industry Products each year has a total value of [REDACTED] from 2014 through June 2020. *See id.* at 223-24.

#### **CMC's Claimed Investments Are "Significant" and "Substantial"**

CMC notes that "[s]ignificant value is added to the Domestic Industry Products by CMC's manufacturing and R&D activities in the United States." *Id.* at 225. CMC's evidence shows that the revenue and volume of Domestic Industry Products made in the U.S. are a significant portion of all [REDACTED]

[REDACTED] and that its domestic activities relating to the Domestic Industry Products are significant compared to others in the market. The Staff agrees that CMC's investments are quantitatively and qualitatively significant.

Staff Br. at 155-57.

For the reasons discussed below, the record evidence supports a finding that CMC has satisfied the economic prong of the domestic industry requirement of 19 U.S.C. § 1337(a) under subparagraphs (A), (B) and (C).

##### **A. CMC's Investments in Plant and Equipment**

CMC has invested in plant and equipment in the United States to undertake activities related to the DI Products—namely, CMC's D9222, D9225, D9228, and D9228 7.5x slurries. Some of these activities occur at CMC's [REDACTED] square feet headquarters

[REDACTED]

in Aurora, Illinois, which includes a [REDACTED] square foot R&D facility (the “870 R&D Facility”). *See JX-0019 (CMC 2019 Form 10-K) at 29; CX-0088C (Floor Plan); CX-0089C (Floor Plan); CX-0090C (Floor Plan).* Some of these activities occur in CMC’s 170,000 square foot manufacturing plant and distribution center (the “845 Enterprise Facility”), which also is located in Aurora, Illinois. *See JX-0019 (CMC 2019 Form 10-K) at 27.*

### **1. Manufacturing at the 845 Enterprise Facility**

The land on which the 845 Enterprise Facility is located had a net book value of [REDACTED] in February 2020, of which approximately [REDACTED] [REDACTED] is allocable to the ‘721 patent. *See CX-0005C (Vander Veen WS) at Q/A 57–58; CDX-0005C.08 (JX-0158C (Assets Necessary for Production)).* This allocation is based on the square footages used to manufacture, and to support the manufacture, of the DI Products. *Id.*

The [REDACTED] and is 100% necessary for manufacturing the DI Products. *See CX-0005C (Vander Veen WS) at Q/A 58; JX-0124C (Facility Breakdown).* The entirety of CMC’s investments in this portion of the 845 Enterprise Facility is allocable to the ‘721 patent even though it may be used to manufacture other products. *See Storage Tapes, Comm’n Op. at 114–15 (Mar. 8, 2018).*

In addition, [REDACTED] [REDACTED] ) is allocable to the ‘721 patent. *See CDX-0005C.08 (JX-0124C (Facility Breakdown)).* The [REDACTED] corresponds to the total sales revenue generated from DI Products as a percentage

of sales revenue generated from all products manufactured at the 845 Enterprise Facility in 2020 [REDACTED]).<sup>52</sup> See CDX-0005C.03 (JX-0127C (854 Enterprise Products D922x Revenue and Volume)). Thus, a total of approximately [REDACTED] of the 845 Enterprise Facility is allocable to the '721 patent. See CDX-0005C.08 (JX-0124C (Facility Breakdown)).

Similarly, certain equipment at the 845 Enterprise Facility is 100% necessary for the manufacture the DI Products [REDACTED]

[REDACTED] while other equipment is used to support those activities [REDACTED]

[REDACTED]  
[REDACTED]). See CX-0001C (Woodland WS) at Q/A 62; JX-0158C (Assets Necessary for Production). The net book value of the assets that are 100% necessary to manufacture the DI Products totaled [REDACTED] as of February 2020, with CMC investing in these assets in the amounts of [REDACTED]

[REDACTED] through February 2020. See CX-0005C (Vander Veen WS) at Q/A 51; CDX-0005C.07 (JX-0158C (Assets Necessary for Production)). The net book value of the assets used to support these manufacturing activities totaled [REDACTED] as of February 2020, with CMC investing in these assets in the amounts of [REDACTED]

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<sup>52</sup> Sales revenue is a more appropriate allocation method than sales volume because [REDACTED]

[REDACTED] See CX-0001C (Woodland WS) at Q/A 33, 47.

[REDACTED]. See CX-0005C (Vander Veen WS) at Q/A 60, 122.

[REDACTED] See

CX-0005C (Vander Veen WS) at Q/A 54; CDX-0005C.07 (JX-0158C (Assets Necessary for Production)).

The entirety of CMC's investments in assets necessary for manufacturing the DI Products is allocable to the '721 patent even though those assets may be used to manufacture other products. *See Storage Tapes*, Comm'n Op. at 114–15. Approximately [REDACTED] of the net book value of the assets used to support these activities is allocable to the '721 patent, with allocable annual investments in these assets in the amounts of [REDACTED]

*See CX-0005C (Vander Veen WS) at Q/A 56; CDX-0005C.07 (JX-0158C (Assets Necessary for Production)). This allocation is based on the percentage of sales revenue generated from all products manufactured at the 845 Enterprise Facility in a given year that was from DI Products, which was [REDACTED]*

[REDACTED]. *See CX-0005C (Vander Veen WS) at Q/A 55; CDX-0005C.07 (JX-0158C (Assets Necessary for Production)). Thus, approximately [REDACTED] in net book value in equipment is allocable to the '721 patent, with total allocable annual investments in these assets in the amounts of [REDACTED]*

[REDACTED] *See CDX-0005C.07 (JX-0158C (Assets Necessary for Production)).*

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<sup>53</sup> Although CMC [REDACTED]

[REDACTED]

**2. Engineering, Research, and Development at the 870 R&D Facility**

Of the approximately [REDACTED] square feet that make up the 870 R&D Facility at CMC's Aurora, Illinois headquarters, approximately [REDACTED]

[REDACTED]. See CX-0088C (Floor Plan); CX-0089C (Floor Plan); CX-0090C (Floor Plan). CMC has performed numerous experiments on the DI Products in its clean room and responded to numerous requests relating to the DI Products in its pilot plant over the past [REDACTED]. Approximately [REDACTED]

[REDACTED]  
[REDACTED]. See CX-0005C (Vander Veen WS) at Q/A 81; CDX-0005C.05 (JX-0122C (Clean Room Experiment)). Approximately [REDACTED]  
[REDACTED]  
[REDACTED]. See CX-0005C (Vander Veen WS) at Q/A 81; CDX-0005C.06 (JX-0126C (Year-by-year Slurry Requests)).

The clean room includes extensive [REDACTED]  
[REDACTED]  
[REDACTED] See CX-0001C (Woodland WS) at Q/A 50; CX-0091C (Global Cleanroom Capabilities) at 8–13. The pilot plant is a [REDACTED]  
[REDACTED]  
[REDACTED] See CX-0001C (Woodland WS) at Q/A 50. These assets are all associated with CMC's [REDACTED], which is associated with CMC's [REDACTED] products, which in turn includes the DI Products. The net book value of the

assets associated with CMC's [REDACTED]  
[REDACTED]  
[REDACTED]. See CX-0005C (Vander  
Veen WS) at Q/A 64; CDX-0005C.09–10 (JX-0159C (Aurora Asset List – D922x)).

Based on the percentage of experiments in the clean room that were on the DI  
Products each year, approximately [REDACTED]

[REDACTED]. See CDX-0005C.09 (JX-0159C (Aurora Asset List–D922x)).

Alternatively, based on the percentage of requests in the pilot plant related to the DI

Products each year, approximately [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]. See CDX-0005C.10 (JX-0159C (Aurora Asset List – D922x)).

### **3. Total Allocated Investments in Plant and Equipment**

Allocating CMC's domestic investments at the 870 R&D facility based on the  
percentage of experiments in the clean room were on the DI Products each year, CMC  
invested a total of [REDACTED] in assets that were  
allocable to the '721 patent from 2014 through February 2020, which resulted in those  
assets having a net book value of [REDACTED]  
[REDACTED] as of February 2020. Further, when allocating CMC's domestic investments at

[REDACTED]

the 870 R&D facility based on the percentage of requests in the pilot plant that were related to the DI Products each year, CMC invested a total of [REDACTED] [REDACTED] in assets that were allocable to the ‘721 patent from 2014 through February 2020, which resulted in those assets having a net book value of [REDACTED] [REDACTED] as of February 2020. The differences between these domestic investments in plant and equipment allocated based on these two methodologies are negligible. Both methodologies demonstrate that CMC’s investments are quantitatively significant on their face.

#### **B. CMC’S Investment in Labor and Capital**

CMC has employed and continues to employ a significant workforce in the United States. In this regard, employees at CMC’s 845 Enterprise Facility include technicians, engineers, and other personnel that perform manufacturing activities for the DI Products—activities that are necessary to make saleable products for CMC’s customers in the United States. Employees at CMC’s 870 R&D Facility include scientists, engineers, technicians, and other personnel that invented, research, develop, engineer, improve, and commercialize the DI Products. CMC invests a significant amount of money in salaries, incentives, and other compensation and benefits for these employees and also makes significant investments in operating expenses, capital expenditures, and material costs in the United States to support the work of these employees in connection with the DI Products.

**1. Manufacturing at the 845 Enterprise Facility**

CMC employed [REDACTED]

[REDACTED]. JX-0123C (Headcount Summary). CMC's investments in salaries, bonuses, and shared base compensation for employees at the 845 Enterprise Facility working on the manufacture of [REDACTED]

[REDACTED]. See CX-0005C (Vander Veen WS) at Q/A 70; CDX-0005C.11 (CX-0086C (Costs – FY14-FY20)).

In addition to these investments in labor, CMC also makes investments in the employment of capital at the 845 Enterprise Facility. CMC's investments in the employment of capital include costs of goods sold, inventory costs, and packaging costs.

CMC invested [REDACTED]

[REDACTED]. See CDX-0005C.14 (CX-0086C (Costs – FY14-FY20)). These expenditures are specific to [REDACTED] products manufactured at the 845 Enterprise Facility.

The DI Products accounted for [REDACTED]

[REDACTED] 0. See CDX-0005C.03 (JX-0127C (854 Enterprise Products D922x Revenue and Volume)). Thus, of CMC's investments in labor during these years, [REDACTED]

[REDACTED]. See CX-0005C (Vander Veen WS) at Q/A 72; CDX-0005C.11 (CX-0086C (Costs – FY14-FY20)). Of CMC’s investments in capital during these years, [REDACTED]

[REDACTED] See CX-0005C (Vander Veen WS) at Q/A 77; CDX-0005C.14 (CX-0086C (Costs – FY14-FY20)).

## **2. Engineering, Research, and Development at the 870 R&D Facility**

CMC employed [REDACTED] at the 870 R&D facility working on CMP slurries [REDACTED]  
[REDACTED]. See JX-0123C (Headcount Summary). CMC’s investments in salaries, bonuses, and shared base compensation for employees at the 870 R&D Facility was [REDACTED]

[REDACTED] See CX-0005C (Vander Veen WS) at Q/A 80; CDX-0005C.12–13 (JX-0125C (COGS FY14-FY20)).

CMC also makes investments in the employment of capital at the 870 R&D facility. CMC’s investments in the employment of capital include the costs of employee training, the costs of operation and lab supplies, and other miscellaneous expenses. CMC invested [REDACTED]  
[REDACTED] See CX-0005C (Vander Veen WS) at Q/A 85; CDX-0005C.15–16 (JX-0125C (COGS FY14-FY20)).

Based on the percentage of experiments in the clean room that were on the DI Products from 2014 through June 2020, investments in labor of [REDACTED]

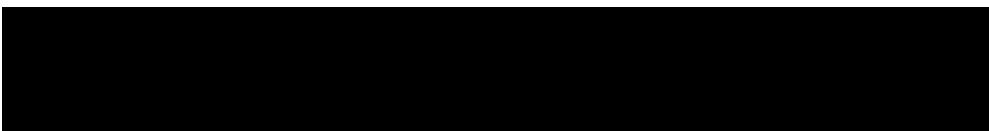
[REDACTED]  
[REDACTED] and  
investments in capital of [REDACTED]

[REDACTED] See CX-0005C (Vander Veen WS) at Q/A 93; CDX-0005C.12,15 (CX-0101C (R&D – FY14-FY20)). Alternatively, based on the percentage of requests in the pilot plant related to the DI Products from 2014 through June 2020, investments in labor of [REDACTED]  
[REDACTED]  
[REDACTED] See CX-0005C (Vander Veen WS) at Q/A 93; CDX-0005C.13,19 (CX-0101C (R&D – FY14-FY20)).

### **3. Total Allocated Investments in Labor and Capital**

Allocating CMC’s domestic investments at the 870 R&D facility based on the percentage of experiments in the clean room, CMC invested a total of [REDACTED] [REDACTED]) in labor and capital that was allocable to the ‘721 patent from 2014 through June 2020. Allocating CMC’s domestic investments at the 870 R&D facility based on the percentage of requests in the pilot plant, CMC invested a total of [REDACTED]

[REDACTED] in assets that were allocable to the ‘721 patent from 2014 through June 2020. Both methodologies demonstrate that CMC’s domestic investments in labor and capital are quantitatively significant.



### C. CMC's Investments in Exploiting the '721 Patent

The claims of the '721 patent are directed to a composition, wherein the composition and its components have certain characteristics. *See supra* § II. Thus, R&D directed to the DI Products, which are compositions having these components and characteristics, is necessarily R&D directed to the patented technology of the '721 patent. A nexus therefore exists between CMC's R&D in the DI Products and the '721 patent.

*See, e.g., Certain Gas Spring Nailer Products & Components Thereof, Inv. No. 337-TA-1082, Comm'n Op. at 80 (Apr. 28, 2020).*

CMC conducts [REDACTED] R&D activities on the DI Products at its 870 R&D Facility. *See CX-0001C (Woodland WS) at Q/A 49, 51.* CMC's investments in exploiting the '721 patent therefore include its investments in plant, equipment, labor, and capital in the 870 R&D Facility. The calculation of these investments is discussed in more detail above.

Allocating CMC's domestic investments at the 870 R&D facility based on the percentage of experiments in the clean room, CMC invested a total of [REDACTED] [REDACTED] in exploiting the '721 patent from 2014 through June 2020. Allocating CMC's domestic investments at the 870 R&D facility based on the percentage of requests in the pilot plant, CMC invested a total of [REDACTED] [REDACTED] in exploiting the '721 patent from 2014 through June 2020. Both methodologies show that CMC's domestic investments in exploiting the '721 patent are quantitatively significant.

[REDACTED]

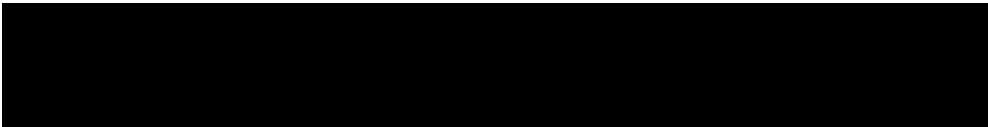
**D. Whether CMC’s Investments Are “Significant” and “Substantial”**

Determining whether an investment is “significant” or “substantial” under 19 U.S.C. § 1337(a)(3) is context-dependent. *Certain Integrated Circuit Chips and Products Containing the Same*, Inv. No. 337-TA-859, USITC Pub. No. 4849, Comm’n Op. at 145 (Nov. 2018). “[T]he magnitude of the investment cannot be assessed without consideration of the nature and importance of the complainant’s activities to the patented products in the context of the marketplace or industry in question.” *Id.* However, “qualitative factors alone are insufficient” to show that an investment is significant. *Lelo Inc. v. International Trade Comm’n*, 786 F.3d 879, 885 (Fed. Cir. 2015). Section 337(a)(3) “requires a quantitative analysis to determine whether there is a ‘significant’ increase or attribution by virtue of the claimant’s asserted commercial activity in the United States.” *Id.* at 883.

“[T]here is no minimum monetary expenditure that a complainant must demonstrate to qualify as a domestic industry under the ‘substantial investment’ requirement” of 19 U.S.C. § 1337(a)(3)(C). *Stringed Musical Instruments*, Comm’n Op. at 25. “[T]he inquiry depends on ‘the facts in each investigation, the article of commerce, and the realities of the marketplace.’” *Certain Carburetors and Products Containing Such Carburetors*, Inv. No. 337-TA-1123, Comm’n Op. at 8 (Oct. 28, 2019) (quoting *Printing and Imaging Devices*, Comm’n Op. at 27).

**CMC’S Total Domestic Investments in the ‘721 Patent**

The below table summarizes CMC’s investments in the ‘721 patent by category:



|                                 | Plant & Equipment<br>(Annual) | Plant & Equipment<br>(Net Book) | Labor and Capital | Exploitation |
|---------------------------------|-------------------------------|---------------------------------|-------------------|--------------|
| <b>By Clean Room Experiment</b> | [REDACTED]                    | [REDACTED]                      | [REDACTED]        | [REDACTED]   |
| <b>By Pilot Plant Request</b>   | [REDACTED]                    | [REDACTED]                      | [REDACTED]        | [REDACTED]   |

For the reasons discussed below, investments shown above are quantitatively and qualitatively significant and substantial, and separately satisfy the economic prong of the domestic industry requirement under each of subsections (A), (B), and (C) of section 337(a)(3). The evidence shows that CMC's domestic investment in plant and equipment and labor associated with research and development has been both significant and substantial in overall context.

CMC's manufacturing and R&D activities in the United States add significant value to the DI Products. [REDACTED] R&D for these products occurred and continues to occur in the United States, as does CMC's manufacturing process, which is needed to produce the final, saleable product. *See JX-0099C (iDIEL D9228 Technology Transfer package, dated August 8, 2017); JX-0088C (iDIEL D9225 Technology Transfer Package, May 2018).* These value-added activities establish the qualitative significance of CMC's domestic activities. *See, e.g., Certain Male Prophylactic Devices, Inv. No. 337-TA-546, Comm'n Op. at 41–46 (Aug. 1, 2007).*

CMC's labor and equipment at the 845 Enterprise Facility account for an average of approximately [REDACTED].

*See JX-0156C (CMC Rolled Up Cost Report).* Further, CMC's domestic activities add

well over [REDACTED] of the D9225 product and D9228 products. In 2020, for example, D9225 and D9228 slurries were manufactured from approximately [REDACTED] [REDACTED]. *See id.* CMC's average sales price was [REDACTED] [REDACTED]. *See, e.g.*, JX-0157C (D922x Sales) at "D9228 Broken Out" Tab. Thus, CMC's domestic activities also add significant monetary value to the D9225 and D9228 products.

CMC's investments also are significant because the revenue and volume of the DI Products made in the United States comprise a large portion of the revenue and volume of all [REDACTED] slurries made and sold by CMC in the United States. *See* JX-0127C (854 Enterprise Products D922x Revenue and Volume). For example, domestic production of the DI Products comprised approximately [REDACTED]

[REDACTED]  
*See* CX-0005C (Vander Veen WS) at Q/A 105 (citing JX-0052C (D922x Revenue and Volume)). Additionally, CMC's manufacturing headcount at the 845 Enterprise Facility comprised approximately [REDACTED]

[REDACTED] *Id.*

In addition, the number of experiments run in the 870 R&D Facility clean room and number of requests to the 870 R&D Facility pilot plant relating to the DI Products is a significant portion [REDACTED] slurry experiments/requests and all CMP slurry experiments/requests. *See* JX-0122C (Clean Room Experiment); JX-0126C (Year-by-year Slurry Requests). CMC's "Slurry R&D" headcount in Aurora comprised [REDACTED],

[REDACTED] . See CX-0005C (Vander Veen WS) at Q/A 105 (citing JX-0123C (Headcount Summary)).

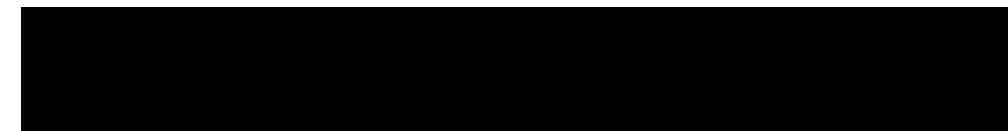
CMC's domestic activities with respect to the DI Products also are significant compared to others in the marketplace. For example, revenue from the D9228 and D9225 slurries made in the United States is significantly higher than the revenue and volume attributable to the DuPont's Accused Products. *Compare* JX-0272C (Sales & StdMargin – Adhoc Financial Analysis) *with* JX-0052C (D922x Revenue and Volume); *see also* CX-0005C (Vander Veen WS) at Q/A 102.

\* \* \*

Accordingly, the record evidence supports a finding that CMC has satisfied the economic prong of the domestic industry requirement of 19 U.S.C. § 1337(a) under subparagraphs (A), (B) and (C).

## **VI. Conclusions of Law**

1. The Commission has subject matter, personal, and *in rem* jurisdiction in this investigation.
2. The Accused Products have been imported or sold for importation into the United States.
3. The Accused Products infringe the asserted claims of U.S. Patent No. 9,499,721.
4. The domestic industry requirement has been satisfied with respect to U.S. Patent No. 9,499,721.



5. It has not been shown by clear and convincing evidence that the asserted claims of U.S. Patent No. 9,499,721 are invalid.

## **VII. Initial Determination on Violation**

Accordingly, it is the INITIAL DETERMINATION of the undersigned that a violation of section 337 (19 U.S.C. § 1337) has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation, of certain chemical mechanical planarization slurries and components thereof that infringe the asserted claims of U.S. Patent No. 9,499,721.

Further, this Initial Determination, together with the record of the hearing in this investigation consisting of (1) the transcript of the hearing, with appropriate corrections as may hereafter be ordered, and (2) the exhibits received into evidence in this investigation, is CERTIFIED to the Commission.

In accordance with 19 C.F.R. § 210.39(c), all material found to be confidential by the undersigned under 19 C.F.R. § 210.5 is to be given *in camera* treatment.

The Secretary shall serve a public version of this ID upon all parties of record and the confidential version upon counsel who are signatories to the Protective Order, as amended, issued in this investigation.

Pursuant to 19 C.F.R. § 210.42(h), this Initial Determination shall become the determination of the Commission unless a party files a petition for review pursuant to § 210.43(a) or the Commission, pursuant to § 210.44, orders on its own motion a review of the ID or certain issues herein.

## VIII. Recommended Determination on Remedy and Bonding

This is the recommended determination of the administrative law judge on remedy and bonding.

The administrative law judge must issue a recommended determination concerning the appropriate remedy in the event that the Commission finds a violation.

*See* 19 C.F.R. § 210.42(a)(1)(ii). That recommendation is contained herein below.

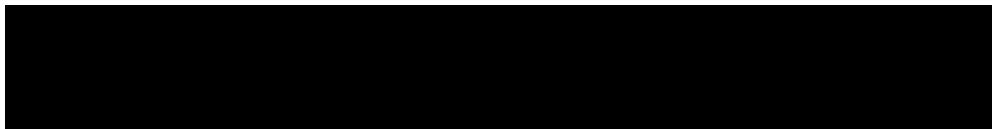
Nevertheless, the Commission did not authorize the administrative law judge to take public interest evidence or to provide findings and recommendations concerning the public interest. Thus, in accordance with the usual Commission practice and the applicable Commission Rule, only the Commission can determine the role that public interest factors may play in this investigation. *See* 19 C.F.R. § 210.50(b)(1).

### A. Limited Exclusion Order

The Commission has broad discretion in selecting the form, scope, and extent of the remedy in a section 337 proceeding. *Viscofan, S.A. v. United States Int'l Trade Comm'n*, 787 F.2d 544, 548 (Fed. Cir. 1986). A limited exclusion order directed to respondents' infringing products is among the remedies that the Commission may impose. *See* 19 U.S.C. § 1337(d).

CMC argues:

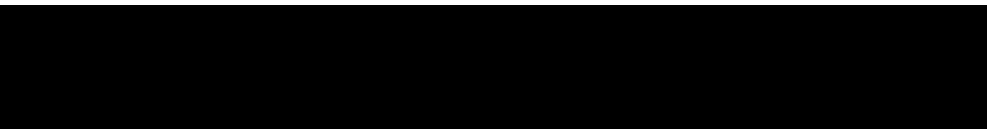
If a violation of Section 337 is found and it is not otherwise determined to be contrary to the public interest, “the Commission … *shall* direct that the articles concerned … be excluded from entry into the United States”. 19 U.S.C. § 1337(d)(1). The articles concerned here are “[CMP] slurries and components thereof, *including colloidal silica*.<sup>85</sup> FED. REG. 40685 at 40686. Thus, any limited exclusion order (“LEO”) that issues in this Investigation “shall” be directed not only to DuPont’s infringing CMP slurries, but also to the imported components of those slurries, “including colloidal silica.”



With regard to DuPont's infringing CMP slurries, the LEO should cover all such slurries, not just Optiplane 2600. It is irrelevant that "CMC ... has not shown that any other Accused Slurry Products, specifically Optiplane™ 2300A, Optiplane™ 2300 [REDACTED], Optiplane™ 2602, Optiplane™ 2601, [REDACTED], and Optiplane™ 2300 [REDACTED]) have been imported into the U.S." See RPreHBr at 35. The Commission has *in rem* jurisdiction over all these slurries (if they are determined to infringe) because DuPont's importation of Optiplane 2600 alone satisfies the importation requirement of Section 337, as discussed *supra* at § III.B.1. *See also* 19 U.S.C. § 1337(a)(B)(1)(i). Indeed, "while individual models may be evaluated to determine importation and infringement, the Commission's jurisdiction extends to ***all models*** of infringing products that are imported at the time of the Commission's determination and to ***all such products that will be imported*** during the life of the remedial orders." *Certain Hardware Logic Emulation Systems & Components Thereof*, Inv. No. 337-TA-383, Comm'n Op. at 16 (Mar. 31, 1998). Thus, the LEO should apply to all of DuPont's infringing CMP slurries, not just Optiplane 2600.

DuPont also should be barred from importing the components of these infringing CMP slurries, "including colloidal silica." 85 FED. REG. 40685 at 40686. DuPont's imported colloidal silica particles contribute to and induce infringement of the '721 Patent. *See supra* § VI.C; *see also Network Devices II*, Comm'n Op. at 123 (finding that components of infringing products should be excluded from entry where components induced infringement). Even if it is determined that these particles do not contribute to or induce infringement, DuPont should at least be barred from importing these components and combining them into infringing CMP slurries in the United States. *See id.* ("[Respondent] is barred from importing components of its devices and then assembling those devices into infringing products."); *Marine Sonar*, Comm'n Op. at 8 (clarifying that an LEO covered imported components that did not individually infringe but were used "for the purposes of assembling or 'kitting' the infringing devices"); *Network Devices I*, Comm'n Op. at 23 (finding that respondent would "circumvent a Commission remedy by importing only the components of the accused products for reassembly into complete functional [products]").

At bottom, the imported colloidal silica particles should be excluded from entry because they are expressly recited in the asserted claims, they are a material part of the claimed invention, and the asserted method of use claims cannot be practiced without them. *See Network Devices I*, Comm'n Op. at 22, 23 (finding that respondent would "circumvent a Commission remedy by importing only the components of the accused products for reassembly into complete functional [products]"



where “[t]he various components of the imported accused products [were] claimed in the asserted apparatus claims, and asserted method claim 1 could not be carried out without the accused products”); *Fluidized Supporting Apparatus*, ID, 1984 WL 273788 at \*55.

Compl. Br. at 240-42.

Respondents argue:

In this Investigation, CMC has requested that the Commission issue a limited exclusion order covering “all of Respondents’ CMP slurries and components thereof that infringe one or more of the Asserted Claims.” CMC PreHB at 228. Such an expansive request is not supported by the evidentiary record.

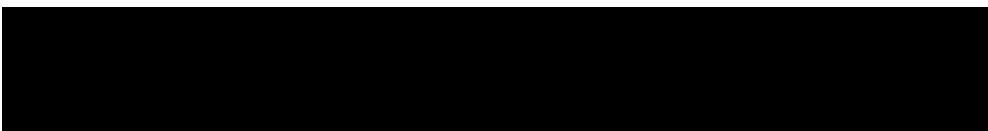
### **1. Carve-Outs are Warranted**

In particular, throughout the course of the Investigation, DuPont has produced technical information and other discovery regarding a host of DuPont CMP slurries with a pH between about 1.5 and about 7. EDIS Doc ID 719941 (Respondents’ Resp. to Complainant’s List of Proposed Representative Products). CMC has not accused these products of infringement or included them in the Joint Stipulation Regarding Representative Accused Products. JX-0403C (Joint Stipulation Regarding Representative Accused Products). As such, any exclusion order that issues should expressly carve out these products from the order.

In addition, CMC appears to be taking the position that any proposed remedial order should include all imported “components thereof,” [REDACTED]. CMC PreHB at 227-28; JX-0399C (10/23/20 CMC Supp. Resp. to First Interrogs.) at 256-57. CMC has only raised direct infringement allegations for the ‘721 patent against the Optiplane™ 2300 and 2600 slurry products and indirect infringement allegations based on the [REDACTED] particle. See, e.g., JX-0394C (10/9/20 CMC Supp. Resp. to First Interrogs., Ex. A-1 (Infringement Chart for OP 2300)) at 12-19 (claim [1c]); JX-0395C (10/9/20 CMC Supp. Resp. to First Interrogs., Ex. A-2 (Infringement Chart for OP 2600)) at 13-19 (claim [1c]). CMC has thus waived the argument that the importation of [REDACTED]

[REDACTED] for use in the Optiplane™ 2300 and 2600 products directly infringe the ‘721 patent. Thus, CMC has also waived any argument that these components induced or contributed to the infringement of the ‘721 patent. Moreover, DuPont has provided unchallenged evidence that [REDACTED]

[REDACTED] are used in numerous other CMP slurries manufactured by DuPont in the U.S. that CMC has not alleged to infringe the ‘721 patent. RX-1398C (Jacobs Reb. WS) at QA 18-23.



Thus, as the Staff also agrees, any LEO should expressly carve-out, [REDACTED], which Cabot chose not to accuse of infringement in this investigation. Staff PreHB at 171.

## **2. The LEO Should Include a Certification Provision**

Moreover, to the extent that the ALJ recommends that a limited exclusion order issues, any such limited exclusion order should contain a certification provision in order to facilitate enforcement of the order by the U.S. Bureau of Customs and Border Protection.

Reps. Br. at 234-36.

The Staff argues, *inter alia*:

The Staff believes that any issued LEO should extend to all infringing CMP slurry products, including those identified in the parties' Joint Stipulation Regarding Representative Accused Products. The Staff agrees that the LEO should also cover the [REDACTED] particles incorporated in the Accused Products, because as CMC states, those particles properly construed, expressly recited claim language, and also are a "material part" of DuPont's Accused Products. The Staff also agrees that a certification provision may help facilitate enforcement of the LEO.

Staff Br. at 159.

The administrative law judge recommends that in the event the Commission determines that a violation of section 337 has occurred, and if consideration of the statutory public interest factors does not require that remedies be set aside or modified, the Commission should issue a limited exclusion order covering all of the infringing articles ("chemical mechanical planarization ("CMP") slurries and components thereof, including colloidal silica.")<sup>54</sup> imported, sold for importation, or sold after importation by respondents and should apply to respondents' affiliated companies, parents, subsidiaries or other related business entities, or their successors or assigns.

Further, inasmuch as respondents have persuasively argued that certain

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<sup>54</sup> See Order No. 3 (citing 85 Fed. Reg. 40685 (July 7, 2020)) (July 16, 2020).

[REDACTED]

components may have non-infringing uses, in the event the Commission does issue a limited exclusion order in this investigation, the exclusion order should include a provision that allows the respondents to certify, pursuant to procedures to be specified by U.S. Customs and Border Protection, that they are familiar with the terms of the order, that they have made appropriate inquiry, and that, to the best of their knowledge and belief, the products being imported are not excluded from entry under the order.

#### **B. Cease and Desist Order**

Section 337 provides that in addition to, or in lieu of, the issuance of an exclusion order, the Commission may issue a cease and desist order as a remedy for a violation of section 337. 19 U.S.C. § 1337(f)(1). The Commission “generally issues a cease and desist order only when a respondent maintains a commercially significant inventory of infringing products in the United States.” *Certain Ground Fault Circuit Interrupters and Products Containing Same*, Inv. No. 337-TA-615, Comm’n Op. at 24 (Mar. 26, 2009); *Certain Video Game Systems, Accessories, and Components Thereof*, Inv. No. 337-TA-473, Comm’n Op. at 2 (Dec. 24, 2002).

CMC argues that “[a] cease-and-desist order (‘CDO’) should issue in this Investigation.” Compl. Br. at 242.

Respondents argue, *inter alia*:

CMC fails to meet its burden to demonstrate that such inventories are “commercially significant.” DuPont has produced information regarding its inventory of Accused Products, including the inventory of BS-3 particles. JX-0276C (Native Excel - Rep. for Inventory Volume and Value From Sept. 2019 thru Sept. 16, 2020). The inventory for the slurry products represents [REDACTED] of sales to customers and is thus not commercially significant. CX-0012C (Jacobs Depo. Tr.) at 199:10-1, 203:4-13 (testimony regarding inventory of BS-3 particles).

[REDACTED]

CMC has offered no infringement allegations with respect to [REDACTED]. See, e.g., JX-0394C (10/9/20 CMC Supp. Resp. to First Interrogs., Ex. A-1 (Infringement Chart for OP 2300)) at 12-19 (claim [1c]); JX-0395C (10/9/20 CMC Supp. Resp. to First Interrogs., Ex. A-2 (Infringement Chart for OP 2600)) at 13-19 (claim [1c]). CMC has thus waived the argument that the importation of [REDACTED] for use in the Optiplane™ 2300 and 2600 products directly infringe the '721 patent. Thus, a CDO directed to these components would be unwarranted.

Reps. Br. at 236-37.

The Staff argues:

CMC's evidence shows that DuPont's domestic inventory of accused CMP slurry *product* as of September 2020, by CMC's calculations, "corresponds to a weighted average of [REDACTED] of inventory of infringing slurries," not including the inventory relating to colloidal silica *particles* that can be used to manufacture additional accused slurry products beyond the end of the Presidential review period. CMC Br. at 231. CMC points to testimony from a DuPont witness stating that [REDACTED] as to how much inventory DuPont typically has on hand at any given time, as support for CMC's position that DuPont will have greater than 60 days of inventory on hand, thus warranting issuance of a CDO. *Id.* at 232.

DuPont responds that its inventory levels represent [REDACTED] of anticipated sales and therefore is not commercially significant. DuPont further contends that any CDO should exclude [REDACTED] present in the Accused Products, but were not the subject of any infringement allegations or proofs by CMC.

The Staff is of the view that a CDO is warranted in view of evidence suggesting that DuPont typically has [REDACTED] of inventory on hand at any given time, thus presenting a risk that DuPont could sell its domestic inventory beyond the 60-day Presidential review period, thereby undercutting the remedial effect of any issued LEO.

Staff Br. at 159-60.

As of September 2020, DuPont maintained the following inventories of accused CMP slurries and colloidal silica particles:

| Product    | Volume<br>(kg) | Value<br>(USD) |
|------------|----------------|----------------|
| [REDACTED] | [REDACTED]     | [REDACTED]     |

*See JX-0276C (Inventory Volume and Value – Sept. 2019 thru Sept. 16, 2020). Dr. Vander Veen determined that this corresponds to a weighted average of [REDACTED] of inventory of infringing slurries. See CX-0005C (Vander Veen DWS) at Q/A 111; CDX-0005C.21 (JX-0272C (Sales & StdMargin – Adhoc Financial Analysis); JX-0276C (Inventory Volume and Value – Sept. 2019 thru Sept. 16, 2020)). This does not include the colloidal silica particles listed above [REDACTED], which can be used to manufacture additional inventory of infringing slurries that could be sold even further beyond the end of the Presidential review period.*

Although respondents claim in their interrogatory responses that the above inventory [REDACTED]

[REDACTED] *See CX-0085C*

(Respondents' Discovery Responses) at 326. Respondents' Product Scale-Up Leader, Mr. Kevin Jacobs, testified that [REDACTED]

[REDACTED]” See CX-0012C (Jacobs Dep.) at 199–201. Exhibit JX-0276C shows, for example, that levels of [REDACTED] inventory [REDACTED] [REDACTED]. See JX-0276C (Inventory Volume and Value – Sept. 2019 thru Sept. 16, 2020) at “[REDACTED] Inventory” Tab. The inventory levels had then [REDACTED] by September 2020—the date for which the data in the table above was provided. Thus, it appears likely that respondents’ inventories of [REDACTED] have since been replenished and represent [REDACTED] [REDACTED].

Mr. Jacobs testified that [REDACTED] [REDACTED]. See CX-0012C (Jacobs Dep.) at 199–200, 201, 202. Mr. Jacobs also testified that respondents generally [REDACTED] [REDACTED] [REDACTED] r. *Id.* at 201–203. Thus, it is reasonable to conclude that, even by their own estimates, respondents maintain [REDACTED] [REDACTED]. A CDO is therefore needed here to prevent respondents from undercutting the remedial effect of an LEO.

### C. Bond

Pursuant to section 337(j)(3), the administrative law judge and the Commission must determine the amount of bond to be required of a respondent, during the 60-day Presidential review period following the issuance of permanent relief, in the event that the Commission determines to issue a remedy. The purpose of the bond is to protect the

[REDACTED]

complainant from any injury. 19 U.S.C. § 1337(j)(3); 19 C.F.R. §§ 210.42(a)(1)(ii), 210.50(a)(3).

When reliable price information is available, the Commission has often set bond by eliminating the differential between the domestic product and the imported, infringing product. *Certain Microsphere Adhesives, Processes for Making Same, and Products Containing Same, Including Self-Stick Repositionable Notes*, Inv. No. 337-TA-366, Comm'n Op. at 24 (1995). In other cases, the Commission has turned to alternative approaches, especially when the level of a reasonable royalty rate could be ascertained. *Certain Integrated Circuit Telecommunication Chips and Products Containing Same, Including Dialing Apparatus*, Inv. No. 337-TA-337, Comm'n Op. at 41 (1995). A 100 percent bond has been required when no effective alternative existed. *Certain Flash Memory Circuits and Products Containing Same*, Inv. No. 337-TA-382, USITC Pub. No. 3046, Comm'n Op. at 26-27 (July 1997) (a 100% bond imposed when price comparison was not practical because the parties sold products at different levels of commerce, and the proposed royalty rate appeared to be *de minimis* and without adequate support in the record).

CMC argues that “CMC and Staff agree that a bond rate of 100% here is necessary to offset [ ] competitive advantages.” Compl. Br. at 244. CMC argues:

*First*, CMC and Staff agree that competitive harm could occur during the Presidential review period, as evidenced by the [REDACTED]

*See CPreHBr at 234;*

SPreHBr at 172.

[REDACTED] *See RX-0135C (M. Cavanaugh Email Chain re D9228 Competitive Info) at 2.* [REDACTED]

[REDACTED] *See JX-0157C (D922x Sales) at “D9228 Broken Out” Tab.*

[REDACTED]

*Second*, CMC and Staff agree that [REDACTED]

[REDACTED] See CPreHBr at 235–236; SPreHBr at 172. The prices that [REDACTED]

[REDACTED]. See CX-0005C (Vander Veen DWS) at Q/A 118; *see also* SPreHBr at 172. And [REDACTED]

[REDACTED] JX-0399C (CMC's Discovery Response) at 206; RX-0682C (Woodland Dep.) at 263:11–16, 264:24–265:10. Thus, a bond rate of 100% is appropriate. *See Certain Integrated Repeaters, Switches, Transceivers & Products Containing Same*, Inv. No. 337-TA-435, ID at 208 (Jul. 19, 2001), aff'd Comm'n Op. at 32 (Aug. 16, 2002); *Certain Optical Disk Controller Chips & Chipsets & Products Containing Same, Including DVD Players & PC Optical Storage Devices*, Inv. No. 337-TA-506, Comm'n Op. at 62 (Sept. 28, 2005); *Skin Care Devices*, Comm'n Op. at 36; *Certain Flash Memory Circuits & Products Containing the Same*, Inv. No. 337-TA-382, Comm'n Op. at 41–42 (Jun. 26, 1997).

With regard to pricing, [REDACTED]

while [REDACTED]

*Compare* JX-

0157C (D922x Product Sales) at "D9228 Broken Out" Tab (average sales prices); JX-0161C (Product Densities); JX-0149C (Particles in Products) *with* JX-0344C (sales prices); JX-0392C (sales volumes). The impracticality of comparing these prices is compounded by the fact that [REDACTED]

A similar problem exists with respect to the colloidal silica particles that are purchased to manufacture these CMP slurries. For example, [REDACTED]

while [REDACTED]

*Compare* CX-0084C

(component costs) *with* JX-0349C [REDACTED] orders).

It is irrelevant that [REDACTED]

[REDACTED] Thus, Dupont still is able to injure CMC through the

[REDACTED]

purchase of these colloidal silica particles.

For similar reasons, bond has been deemed appropriate to prevent injury even when a complainant's domestic industry products were [REDACTED] than a respondent's infringing products. See, e.g., *Certain Wireless Commc'n Devices, Portable Music & Data Processing Devices, Computers & Components Thereof*, Inv. No. 337-TA-745, RD at 6 (May 9, 2012) (concluding that "price differential would not be an accurate measure on which to base the bond rate" and setting bond based on a royalty rate where "[respondent's] products sell for more than [complainant's] competing products"); *Certain Abrasive Products Made Using a Process for Powder Preforms, & Products Containing Same*, Inv. No. 337-TA-449, Comm'n Op. at 10 (Jul. 26, 2002) (recommending bond based on royalty rate even through "U.S. prices for [respondent's] products are equal to or above the prices for [complainant's] products"); *Certain Excimer Laser System for Vision Correction Surgery & Components Thereof & Methods for Performing Such Surgery*, Inv. No. 337-TA-419, RD at 11, 12 (Dec. 15, 1999) (setting bond based on lost fees even though "there was no price undercutting"). Bond is likewise appropriate and necessary to prevent injury to CMC here. That bond should be in an amount of 100% of the entered value of DuPont's infringing CMP slurries (e.g., the Optiplane 2300 and 2600 product families) and the infringing components thereof (e.g., [REDACTED] particles).

A bond rate of 100% is both appropriate and conservative, particularly as applied to DuPont's [REDACTED] particles. It is less than the rate [REDACTED]

[REDACTED] See JX-0157C at "D9228 Broken Out"

Tab (average sales prices); JX-0161C; JX-0149C; JX-0344C (Sales Prices); JX-0392C (Sales Volumes). And regardless of what the actual price differential is for any particular CMP slurry, DuPont's imported [REDACTED] particles necessarily cost less than the slurry into which they are incorporated or else DuPont would not be able to make a profit. Thus, DuPont will necessarily pay a smaller overall bond amount for importing [REDACTED] particles, rather than the more expensive CMP slurries into which those particles are incorporated. It would therefore be fair, reasonable, and appropriate to apply a bond rate of 100% to both DuPont's infringing CMP slurries *and* the components, "including colloidal silica." 85 FED. REG. 40685 at 40686.

*Id.* at 244-47.



Respondents argue:

A bond of zero is appropriate because CMC has failed to meet its burden to show the need for a bond, and the available evidence supports a bond of zero. “The Commission frequently sets the bond by calculating the difference in sales prices between the patented domestic product and the infringing product or based upon a reasonable royalty.” *Certain Table Saws Incorporating Active Injury Mitigation Tech. and Components Thereof*, Inv. No. 337-TA-965, Comm’n Op. at 13 (Feb. 1, 2017). CMC has offered no evidence or analysis regarding reasonable royalty, and, despite calculating a bond rate in its contentions, has offered only conclusory testimony and attorney argument that a price differential was impractical because of complexities in comparing prices between the Domestic Industry Products and the Accused Products. CX-0005C (Vander Veen WS) at QA 117-118. Because CMC has failed to meet its burden, no bond should be imposed. “[T]he complainant has the burden of supporting any proposition it advances, including the amount of the bond.” *Certain Rubber Antidegradants, Components Thereof, and Prods. Containing Same*, Inv. No. 337-TA-533, Comm’n Op., at 39-40 (July 21, 2006); 5 U.S.C. § 556(d).

### **1. No Injury**

CMC has failed to show that entry of a bond is required to prevent competitive injury to CMC. CX-0005C (Vander Veen WS) at QA 115; RX-1400C (Herrington Reb. WS) at QA 49-52; RX-1433C (Herrington Errata). In its Pre-Hearing Brief, CMC newly relies on a number of documents to show that the Accused Slurry Products compete directly with the Domestic Industry Products. But these documents do nothing to help support CMC’s position.

As an initial matter, CMC fails to acknowledge that the only evidence of importation of an Accused Slurry Product was a return of a shipment of Optiplane™ 2300 [REDACTED] See § IV. This sole shipment of Optiplane™ 2300 [REDACTED] [REDACTED], has caused CMC no competitive injury. RX-1400C (Herrington Reb. WS) at QA 53-58; JX-0406C (10/16/20 DuPont Supp. Resp. to Third Interrogs.) at 27; RX-1398C (Jacobs Reb. WS) at QA 9-10. CMC’s expert, Dr. Vander Veen, admitted that he is not aware of Optiplane™ 2600 ever being imported into the U.S. (Vander Veen Hearing Tr.) at 273:16-18. And that he has never offered an opinion that a complainant is injured by the importation into the U.S. of [REDACTED] goods for destruction. *Id.* at 274:19-275:4. Thus, CMC’s generalized allegations regarding “harm” do not comport with the facts of this investigation and the purpose of a bond.

[REDACTED]

Moreover, for the first time in its Pre-Hearing Brief, based solely on a single email (RX-0135C), CMC has attempted to prove harm based [REDACTED] CMC PreHB at 234. CMC misleadingly argues that [REDACTED]

[REDACTED] *Id.* But as CMC's own expert admitted at the hearing, this email referred to a non-accused product and did not even mention the accused products (Optiplane™ 2300 and 2600), and the email further showed that [REDACTED]

[REDACTED]. RX-0135C (10/12/16 Cavanaugh Email String); (Vander Veen Hearing Tr.) at 276:13-278:5. Dr. Vander Veen further admitted that the email does not even state that a [REDACTED]. (Vander Veen Hearing Tr.) at 277:6-8. Indeed, Dr. Vander Veen never even analyzed any price data to support [REDACTED]. *Id.* at 274:19-275:4. Thus, CMC's untimely [REDACTED], based solely on attorney argument and an irrelevant document, should be rejected.

Similarly, CMC has not shown injury with respect to the Accused Components. DuPont does not sell these particles to customers; thus, CMC, cannot claim injury based on their importation. In fact, these particles are components that DuPont purchases from third parties and DuPont does not set the price it pays to third parties for these particles. RX-1400C (Herrington Reb. WS) at QA 59. Moreover, Dr. Vander Veen failed to provide any opinions on competition between CMC and DuPont with respect to the Accused Components. (Vander Veen Hearing Tr.) at 278:14-20.

Finally, CMC has offered no infringement allegations with respect to [REDACTED]. See, e.g., JX-0394C (10/9/20 CMC Supp. Resp. to First Interrogs., Ex. A-1 (Infringement Chart for OP 2300)) at 12-19 (claim [1c]); JX-0395C (10/9/20 CMC Supp. Resp. to First Interrogs., Ex. A-2 (Infringement Chart for OP 2600)) at 13-19 (claim [1c]). Thus, CMC's cannot establish that a bond is required for these non-accused components.

### **3. Failure to Offer a Price Differential or Reasonably Royalty Analysis**

CMC also failed to support its request for 100% bond (or its alternative request for a [REDACTED]). Dr. Vander Veen speculates that a price differential analysis is not possible because [REDACTED]

[REDACTED] CX-0005C

(Vander Veen WS) at QA 117-118.

[REDACTED]

The evidence shows, however, that Dr. Vander Veen's analysis is flawed and lacking in rigor. (Herrington Hearing Tr.) at 480:6-14. In particular, Dr. Vander Veen's analysis completely ignores that CMC did, in fact, calculate a price differential in its interrogatory responses based on the financial information produced during discovery. RX-1400C (Herrington Reb. WS) at QA 62-82; RDX-0006C.005 (Herrington Reb. Demos.) (JX-0399C (10/23/20 CMC Supp. Resp. to First Interrogs.) at 230). But Dr. Vander Veen failed to do the same.

In its Pre-Hearing Brief, CMC attempts to propose a [REDACTED]

[REDACTED] CMC PreHB at 236. But CMC has never provided the underlying calculations for this amount in its contentions and did not even propose a bond of any kind for Optiplane™ 2600. (Vander Veen Hearing Tr.) at 279:21-280:11. And, moreover, its own expert never verified or confirmed the accuracy of these calculations. *Id.* at 280:12-16. Thus, CMC's proposal for the ALJ to recommend a bond that was neither verified or adopted by its own expert is both unreasonable and illogical.

As for the Accused Components, according to CMC, the average sales prices show that DuPont pays [REDACTED] for its particles than CMC pays for the particles used in the Domestic Industry Products, i.e., [REDACTED]. RX-1400C (Herrington Reb. WS) at QA 82; (Vander Veen Hearing Tr.) at 281:8-13. CMC also admits in its Pre-Hearing Brief that it [REDACTED]

[REDACTED] CMC PreHB at 237. CMC attempts to argue that despite this, a bond rate of 100% or [REDACTED] should also apply to the colloidal silica particles. *Id.* at 238. But this argument is easily dismissed as even its own expert admits that when [REDACTED]

[REDACTED] the ALJ recommends no bond. (Vander Veen Hearing Tr.) at 281:14-21. As such, CMC itself has shown, and admitted, that it is entitled to no bond for the Accused Particles. *Certain Access Control Sys. & Components Thereof*, Inv. No. 337-TA-1016, Comm'n Op., 44 (Aug. 21, 2018); *Certain Table Saws Incorporating Active Injury Mitigation Technology and Components Thereof*, Inv. No. 337-TA-965, Comm'n Op. at 15 (Jan. 27, 2017).

Finally, Dr. Vander Veen's opinions are additionally flawed because he offers only a single sentence in his direct testimony regarding the use of a reasonable royalty as a basis for setting the bond. RX-1400C (Herrington Reb. WS) at QA 90-92. Dr. Vander Veen performed no analysis and provided no reasoning as to why a reasonable royalty would not be appropriate. CX-0005C (Vander Veen WS) at QA 119. Dr.



Vander Veen's failure to do so further undermines his and CMC's proposal of a 100% bond. RX-1400C (Herrington Reb. WS) at QA 90-92. In view of the foregoing, the evidence shows that no bond is required for the Accused Slurry Products or Accused Components as CMC has failed to satisfy its burden.

Resps. Br. at 237-41.

The Staff argues:

The Staff is of the view that a bond in the amount of 100% of entered value should be set.

**Competitive Harm.** Although DuPont contends that CMC has not demonstrated any harm that will occur during the Presidential review period, CMC presents evidence of [REDACTED], which the Staff agrees is sufficient to warrant a bond.

**No Reliable Price Differential or Reasonable Royalty Data.** The evidence shows that a price differential would be impractical to calculate given the [REDACTED]

[REDACTED] See CMC Br. at 234-35. The evidence also shows that CMC has never licensed the '721 patent, such that no license agreements are available to determine a reasonable royalty rate.

DuPont disputes that a bond based on price differential is impractical, and notes that CMC did in fact calculate such a bond to be [REDACTED]. Given that such calculations are well in excess of the 100% amount requested by CMC, the Staff believes that a 100% bond is more appropriate.

See Staff Br. at 160.

As shown, the parties briefed the bond issue in detail. The administrative law judge concurs with CMC's and the Staff's positions and analyses. Although CMC's thorough analysis need not be repeated here, CMC has shown that (1) competitive harm could occur during the Presidential review period; (2) a reliable price differential calculation is impractical due, *inter alia*, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Accordingly, the administrative law judge recommends that a bond in the amount of 100% of entered value should be set.

#### **IX. Order**

To expedite service of the public version of this document, the parties shall file a joint proposed public version, on the date and in the manner required by Order No. 18.

*DPShaw*  
\_\_\_\_\_  
David P. Shaw  
Administrative Law Judge

Issued: July 8, 2021

**CERTAIN CHEMICAL MECHANICAL PLANARIZATION  
SLURRIES AND COMPONENTS THEREOF**

**Inv. No. 337-TA-1204**

**PUBLIC CERTIFICATE OF SERVICE**

I, Lisa R. Barton, hereby certify that the attached **INITIAL DETERMINATION** has been served via EDIS upon the Commission Investigative Attorney, **Thomas Chen, Esq.**, and the following parties as indicated, on **August 6, 2021**.



Lisa R. Barton, Secretary  
U.S. International Trade Commission  
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Washington, DC 20436

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**On Behalf of Respondents DuPont de Nemours, Inc., Rohm and Haas Electronic Materials CMP, LLC, Rohm and Haas Electronic Materials CMP Asia Inc., Rohm and Haas Electronic Materials, Rohm and Haas Electronic Materials K.K., and Rohm and Haas Electronic Materials LLC:**

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# Exhibit C

**IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF DELAWARE**

|                                  |   |                    |
|----------------------------------|---|--------------------|
| CMC MATERIALS, INC.,             | ) |                    |
|                                  | ) |                    |
| Plaintiff,                       | ) | C.A. No. 20-738-MN |
|                                  | ) |                    |
| v.                               | ) |                    |
|                                  | ) |                    |
| DUPONT DE NEMOURS, INC., et al., | ) |                    |
|                                  | ) |                    |
| Defendants.                      | ) |                    |
|                                  | ) |                    |

**PLAINTIFF'S PROPOSED CLAIM CONSTRUCTIONS**

CMC Materials, Inc. (“CMC”) hereby proposes that the Court construe the following terms as set forth below. These constructions reflect the final determination of the U.S. International Trade Commission in Investigation No. 337-TA-1204 (the “1204 Investigation”). Defendants chose not to pursue an appeal to the Federal Circuit of the Commission’s final determination, which affirmed and adopted the Administrative Law Judge’s claim constructions without modification, including the below claim constructions.

| <b>Claim Term/Phrase</b>                                                                                                                                                                                                | <b>Claim(s)</b>                                    | <b>Proposed Claim Construction</b>                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| “a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof”                                                                                                       | 1, 26                                              | <p>“the recited chemical species is incorporated sub-surface in the interior of the colloidal silica abrasive particles”</p> <p>Note: In addition, a portion of the recited chemical species may also be at or near the particle surface (such that the chemical species is both internal to and at the surface).</p> <p>The claims may further include additional, unrecited chemical species outside the scope of this limitation.</p> |
| “a chemical species incorporated in the colloidal silica abrasive particles internal to an outer surface thereof wherein the chemical species is a nitrogen containing compound or a phosphorus containing compound...” | 1, 26                                              | <p>“the recited chemical species is a compound that contains nitrogen or phosphorous”</p> <p>Note: The claims may further include additional, unrecited chemical species outside the scope of this limitation.</p>                                                                                                                                                                                                                       |
| “amine”                                                                                                                                                                                                                 | 11                                                 | “an organic compound derived by replacing one or more of the hydrogen atoms in ammonia by organic groups”                                                                                                                                                                                                                                                                                                                                |
| “bonded with the outer surface of the colloidal silica abrasive particles”                                                                                                                                              | 26                                                 | plain and ordinary meaning, i.e., “bonded with the outer surface of the colloidal silica abrasive particles”                                                                                                                                                                                                                                                                                                                             |
| “colloidal silica abrasive particles”                                                                                                                                                                                   | 1, 4–9, 15, 18–21, 23, 26, 28–29, 31–34, 38, 40–44 | “colloidal silica abrasive particles that are prepared via a wet process rather than a pyrogenic or flame hydrolysis process which produces structurally different particles”                                                                                                                                                                                                                                                            |

|                                                                                                              |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| “permanent positive charge of at least [15 or 13] mV”                                                        | 1, 19–21, 26, 28, 38 | <p>“positive charge of at least [15 or 13] mV that is not readily reversible, for example, via flushing, dilution, filtration, and the like.”</p> <p>Note: The recited permanent positive charge values are measured according to the three step procedure described at column 11 of the ‘721 Patent specification: “A permanent positive charge of a specified value [at least N mV] means that the zeta potential of the colloidal silica particles remains above that specified value after the following three step filtration test: A volume of the polishing composition (e.g., 200 ml) is filtered through a Millipore Ultracell regenerated cellulose ultrafiltration disk (e.g., having a MW cutoff of 100,000 Daltons and a pore size of 6.3 nm). The remaining dispersion (the approximately 65 ml of dispersion that is retained by the ultrafiltration disk) is collected and replenished with pH adjusted deionized water. The deionized water is pH adjusted to the original pH of the polishing composition using a suitable inorganic acid such as nitric acid. This procedure is repeated for a total of three filtration cycles. The zeta potential of the triply filtered and replenished polishing composition is then measured and compared with the zeta potential of the original polishing composition. This three step filtration test is further illustrated by way of example in Example 10 of the ‘721 Patent.”</p> |
| “wherein the colloidal silica abrasive particles have a permanent positive charge of at least [15 or 13] mV” | 1, 19–21, 26, 28, 38 | <p>“the colloidal silica abrasive particles in the chemical mechanical polishing composition have a permanent positive charge of at least [15 or 13] mV.”</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| “wherein the chemical species is not an aminosilane or a phosphonium silane”                                 | 1                    | <p>“The recited chemical species is neither an aminosilane nor a phosphonium silane”</p> <p>Note: The claims may further include additional, unrecited chemical species outside the scope of this limitation.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

**Terms with Agreed-Upon Constructions in the 1204 Investigation**

| <b>Claim Term/Phrase</b> | <b>Claim(s)</b> | <b>Proposed Claim Construction</b>                                                                                                                                           |
|--------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| “about”                  | 1, 26           | “approximately”                                                                                                                                                              |
| “acid”                   | 24              | “Acid or the conjugate base (or bases) of the acid”                                                                                                                          |
| “aminosilane”            | 1, 26, 37       | “A compound having amine and silane functional groups”<br><br>Note: The aminosilane compound may be hydrolyzed (or partially hydrolyzed) and/or a condensed species thereof. |
| phosphonium silane       | 1               | “A compound having phosphonium and silane functional groups”                                                                                                                 |

Dated: August 22, 2022

Respectfully submitted,

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**CERTIFICATE OF SERVICE**

I hereby certify that on August 22, 2022, true and correct copies of the within document were served on the following counsel of record at the addresses and in the manner indicated:

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# EXHIBIT D

**THIS EXHIBIT HAS BEEN  
REDACTED IN ITS ENTIRETY**

# EXHIBIT E

**THIS EXHIBIT HAS BEEN  
REDACTED IN ITS ENTIRETY**